Five-Year Review

First Five-Year Review Report
for
Parker Landfill Superfund Site
Town of Lyndonville
Caledonia County, Vermont

September 2004

United States Environmental Protection Agency
Region 1
Boston, Massachusetts

Approved by: Date:

Susan Studlien 09/30/04

Susan Studlien, Director
Office of Site Remediation and Restoration

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ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
AOC	Area(s) of Concern
ARARs	Applicable or Relevant and Appropriate Requirements
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
DCA	Dichloroethane
DCE	Dichloroethene
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
ESE	Environmental Science & Engineering, Inc.
FSA	Feasibility Study Addendum
IC	Institutional Control
IGCLs	Interim Groundwater Cleanup Levels
IWS	Industrial Waste Sites
LEL	Lethal Exposure Limit
LTM	Long-Term Monitoring
LTMP	Long-Term Monitoring Plan
MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
M&E	Metcalf & Eddy, Inc.
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NAPL	Non-Aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
PCE	Tetrachloroethene
PRB	Permeable Reactive Barrier

PRPs	Potentially Responsible Parties
RD	Remedial Design
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SVOCs	Semivolatile Organic Compounds
SWDA	Solid Waste Disposal Area
TAL	Target Analyte List
TBC	To Be Considered
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
TCL	Target Compound List
VOCs	Volatile Organic Compounds
TRC	TRC Environmental Corporation
URS	URS Corporation
VPGQS	Vermont Primary Groundwater Quality Standards
VTAEC	Vermont Agency of Environmental Conservation
VTDEC	Vermont Department of Environmental Conservation

EXECUTIVE SUMMARY

The remedy selected to address contamination at the Parker Landfill Superfund Site, located in Lyndonville, Vermont, includes a multi-layer cap over the SWDA and IWS areas, active gas collection on the SWDA and one IWS area, a source control groundwater extraction and treatment system at the SWDA and IWS areas, natural attenuation of the downgradient aquifer, and institutional controls.

Section X of the ROD describes the remedy for the Site. The remedy includes the following components:

- Construction of multi-layer (RCRA subtitle C) caps over the SWDA and three IWS areas;
- Installation and operation of a gas collection system in the SWDA and IWS-1 area to reduce landfill gas accumulation and lateral migration below the solid waste landfill cap;
- Installation of a source control groundwater treatment system to address overburden and bedrock, the configuration of which was to be determined during pre-design studies of site groundwater;
- Conducting long-term sampling and analysis of groundwater and sediment to assess compliance with the groundwater cleanup levels through natural attenuation and to ensure sediments in nearby brooks/river have not been adversely impacted;
- Institutional controls to protect the cap, and to restrict groundwater use, including the extension of municipal water service to all homes potentially affected by contamination; and
- Review of the Site every five years to evaluate the effectiveness of the remedy.

The capping of the landfill was initiated in April 1999, which is also the trigger date for this five-year review.

The remedy at the Parker Landfill Site currently protects human health and the environment because there is no current use of or exposure to site media containing contaminant concentrations exceeding applicable criteria. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Finalize the institutional controls;
- Continue operation and maintenance of the cap remedy;
- Install gas probes to define the extent of landfill gas and continue monitoring;
- Construct the groundwater remedy;
- Over the next five-year review period, continue the sampling and analysis program as performed during the first five-year review period;
- Evaluate the need to update the IGCL for acetone and consider effects on proposed groundwater treatment technologies;

- Continue 1,4-dioxane analysis of groundwater samples in LTMP wells, consider effects on proposed groundwater treatment technologies and the potential need for additional surface water and groundwater monitoring wells; and
- Update, as necessary, the zone of institutional controls to prevent human consumption of groundwater to include wells with new exceedance of IGCLs.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Parker Landfill Superfund Site		
EPA ID: VTD981062441		
Region: 1	**State: VT**	**City/County: Lyndonville/Caledonia**
SITE STATUS		
NPL status: X Final Deleted Other (specify)		
Remediation status (choose all that apply): **X** Under Construction **X** Operating Complete		
Multiple OUs?* YES **X** NO	**Construction completion date:** 2001 (cap only)	
Has site been put into reuse? YES **X** NO		
REVIEW STATUS		
Lead agency: X EPA State Tribe Other Federal Agency ____________________		
Project Managers: Leslie McVickar, Edward Hathaway		
Review period:** 4 / 30 / 1999 to 4 / 30 / 2004		
Date(s) of site inspection: 5 / 19 / 2004		
Type of review: **X** Post-SARA Pre-SARA NPL-Removal only Non-NPL Remedial Action Site NPL State/Tribe-lead Regional Discretion		
Review number: X 1 (first) 2 (second) 3 (third) Other (specify) __________		
Triggering action: Actual RA Onsite Construction at OU #_____ Actual RA Start at OU#____ Construction Completion Previous Five-Year Review Report **X** Other (specify) **Start of landfill cap construction**		
Triggering action date ***(from WasteLAN)*****:** 4 / 30 / 1999		
Due date ***(five years after triggering action date)*****:** 9 / 30 / 2004		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

- In accordance with the ROD, institutional controls were to be implemented as part of the selected remedy. To date the institutional controls for the site have not been finalized.
- 1,4-dioxane has recently been detected at wells throughout the site at concentrations exceeding VPGQS. This was not previously identified as a COC. Additional surface water sampling and the installation of additional groundwater monitoring wells may need to be implemented based on the collection of additional data.
- Constituents were detected in a monitoring well located outside the institutional control boundary at concentrations exceeding ICGLs. An expanded zone of institutional controls to prevent human consumption of groundwater may be needed based on additional sampling data.
- The groundwater remedy has not been constructed.

Recommendations and Follow-up Actions:

- Finalize institutional controls for the Site.
- Install gas probes to define the extent of landfill gas and continue monitoring.
- Continue 1,4-dioxane analysis of groundwater samples in LTMP wells and consider the need for surface water sampling and additional groundwater monitoring wells.
- Evaluate the need to update the IGCL for acetone.
- Expand the zone of institutional controls based on sampling data that indicate new exceedences of IGCLs.
- Complete the installation of the groundwater treatment remedy.

Protectiveness Statement:

The remedy at the Parker Landfill Site currently protects human health and the environment because there is no current use of or exposure to site media containing contaminant concentrations exceeding applicable criteria. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Finalize the institutional controls;
- Continue operation and maintenance of the cap remedy;
- Install gas probes to define the extent of landfill gas and continue monitoring;
- Complete the installation of the groundwater treatment remedy;
- Over the next five year review period, continue the sampling and analysis program as performed during the first five-year review period;
- Evaluate the need to update the IGCL for acetone and consider effects on proposed groundwater treatment technologies; and
- Update the zone of institutional controls to include wells with new exceedances of IGCLs.

Other Comments:

A residential development may be constructed on the south side of Brown Farm Road. These residences will be connected to the municipal water supply system.

1.0 INTRODUCTION

The purpose of this five-year review is to determine whether the remedy for the Parker Landfill Superfund Site (the Site) is protective of human health and the environment. The methods, findings and conclusions of this review are documented within this Five-Year Review Report. In addition, this report identifies issues found during the completion of this five-year review along with recommendations to address such issues.

The United States EPA must implement five-year reviews consistent with the CERCLA and the NCP. CERCLA §121(c), as amended, states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The NCP § 300.430(f)(4)(ii) of 40 CFR states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This is the first five-year review for the Parker Landfill site. This review is required by statute as the selected remedy includes on-site capping of solid waste and a groundwater remedy which results in site contaminants remaining at the site at concentrations exceeding those associated with unrestricted exposure to site media. The trigger for this statutory review is the start of landfill cap construction in April 1999.

The remedies implemented at the Parker Landfill site that are covered by this review include a multi-layer cap that was completed in 2001, a groundwater remediation remedy that is currently under design and anticipated to begin construction in late 2004, and institutional controls.

2.0 SITE CHRONOLOGY

The chronology of all significant site events and dates is included in Table 1.

Table 1: Chronology of Site Events	
Event	**Date**
Permitted Solid Waste Disposal at Site	October 1971 through 1992
Monitoring wells installed by landfill operator	1979
Preliminary Assessment/Uncontrolled Hazardous Waste Site Evaluation by VT AEC	1984-1985
Proposed NPL listing date	June 21, 1988
NPL listing date	February 16, 1990
Consent Order for RI/FS	August 1990
Initial Site Characterization activities by ESE, Inc.	Aug. 1990 – July 1991
Initial Site Characterization Report by ESE, Inc.	February 10, 1992
RI/FS	July 1990-June 1991
RI report complete	May 2, 1994
FS report complete	June 1, 1994
ROD Signature	April 4, 1995
Quarterly Groundwater Monitoring	1999-present
Landfill Cap	
AOC for Remedial Design	December 1996
Cap design start	1997
Cap design complete	1999
CD for Remedial Action (cap)	April 1999
Cap Construction start	April 1999
Cap Construction end	November 2000
Cap Remedy substantially complete	December 2001
Groundwater Treatment Remedy (currently in design-review phase)	
Unilateral Administrative Order for Remedial Design and Remedial Action	April 26, 1999
Class IV Groundwater Reclassification Petition	May 31, 2001
Draft Institutional Control Report	December 13, 2002
VTDEC Reclassification of Groundwater to Class IV	November 6, 2003
Downgradient Pre-Design Technical Report by URS	November 7, 2003
Draft Source Area Pre-Design Technical Report by URS	January 9, 2004
Alternative Technology Analysis and Evaluation by URS	July 14, 2004
Declaration for the ESD	July 2004
EPA Approval of the Remedial Design	September 22, 2004

3.0 BACKGROUND

Figure 1 shows the location of the Parker Landfill Superfund Site on the southern side of Lily Pond Road in the Town of Lyndonville, Caledonia County, Vermont. The current site configuration is shown on Figure 2. The Site consists of 25 acres located in an area of hilly terrain in the southeast portion of Lyndonville, approximately 0.2 miles southeast of Lily Pond. An unnamed stream traverses the site from northeast to southwest, joining a larger unnamed stream immediately southwest of the site that flows to the Passumpsic River approximately ¼-mile southwest of the site. The site is accessed via four roads: three that begin at Lily Pond Road and intersect the southwest and west sides of the site, and one entering the site from the east.

The site is surrounded by residential areas to the north, wooded, hilly areas to the east, wooded areas and agricultural land to the south, and residential areas to the west. Pastures and cropland are located to the south of the site, beyond Brown Farm Road. A nursing home and a private school are located approximately ½-mile southwest of the site, on Red Village Road. Residential properties located in the vicinity of the site include three mobile home parks located immediately northwest of the site.

The village of Lyndonville operates a municipal water system that supplies water to the residences north and west of the site, including the nearby mobile homes. In the Fall of 1991, this municipal water supply line was extended to properties located along Red Village Road, less than ½-mile southwest of the site. Prior to this, these properties utilized private wells.

According to site reports from the early 1990s, the private drinking water wells located within a three-mile radius of the site served a population of approximately 525. However, due to the implementation of institutional controls near the site (discussed further in Section 4.3) and the expansion of the Village of Lyndonville's municipal water supply infrastructure, this number is expected to be much lower now. The municipal water supply wells that serve as a source of drinking water for the Village of Lyndonville are located 1.75 miles north of the site, and provide water for a population of over 3,200. Potential human and ecological receptors to site contamination include users of private wells up to 0.5 mile downgradient from the site, recreational users of the Passumpsic River and the unnamed tributaries flowing from the site, and biota inhabiting the Passumpsic River and related tributaries.

3.1 Operational and Regulatory History

Historical records reviewed by ESE as part of a 1992 Initial Site Characterization indicate that prior to permitted landfilling of the site, the site area consisted of a borrow pit for the mining of sands, and was used as a Town disposal area starting in the late 1950s.

A Land Use Permit to operate a solid waste disposal facility at the site was granted by the Vermont District No. 7 Environmental Commission on July 17, 1971. Approval to operate as a sanitary landfill was granted under the authority of the Vermont Health Regulations on October 20, 1971. Operation of the landfill began in 1972, and continued through 1992. There were four distinct waste disposal areas at the site; all were unlined. The largest waste disposal area is the SWDA, comprising approximately 14 acres. Adjacent to the SWDA are three smaller industrial waste areas (IWS-1, IWS, 2 and IWS-3), located on the west, south, and east sides of the SWDA, respectively.

During a Preliminary Assessment completed in 1985, the Vermont Agency of Environmental Conservation (VTAEC; currently VTDEC) discovered that prior to 1983, uncontrolled disposal of industrial wastes occurred at the site, resulting in the landfill receiving approximately 1,330,300 gallons of liquid industrial wastes and 688,900 kilograms of solid, semi-liquid and liquid industrial wastes. These wastes included waste oils, plating solutions, degreasers, paint sludges, coolant oils, sodium hydroxide, and trichloroethene or 1,1,1-trichloroethane sludge.

As a result of the findings of the VTAEC during the 1985 Preliminary Assessment and Uncontrolled Hazardous Waste Site Evaluation, the site was referred to EPA for inclusion in the NPL under CERCLA. The EPA added the site to the NPL as a Superfund Site on February 16, 1990. An Administrative Order by Consent for the Remedial Investigation/Feasibility Study (RI/FS) was issued by EPA to the Respondents/PRPs on August 8, 1990. The August 1990 Consent Order for the RI/FS included an order that operations at the landfill must cease on or before July 1, 1992.

3.2 History of Contamination

Between 1979 and 1984, routine groundwater monitoring conducted by the VTDEC indicated the presence of chlorinated VOCs in the groundwater and in the unnamed stream adjacent to the landfill. In 1984, VOCs were detected at concentrations exceeding federal MCLs in groundwater in five private wells approximately 0.5 miles southwest of the site.

In 1985, VTDEC informed four PRPs of their responsibility for performing investigative work and remediation at the site. Following EPA's placement of the site on the NPL, between 1990 and 1994, the PRP consultant, ESE, completed and performed the RI/FS at the Site. The RI/FS report summarized the field investigations, described the nature and extent of wastes and related contaminant source areas, and described subsurface hydrogeology at the site assessed as part of the field investigation. The SWDA was estimated to contain approximately 2 million cubic yards of waste, and based on field studies, was estimated to be about 55 feet deep, on average. Based on observations during the RI/FS, the SWDA was considered a diffuse source of leachate and of contaminants to soil and groundwater. RI/FS assessment results indicated that the IWS areas, due to their history of accepting industrial wastes, were serving as additional, discrete source areas from which the VOCs were leaching into site soils and groundwater.

According to the ROD, COCs for site groundwater were designated as those constituents detected during the RI at concentrations exceeding cleanup goals based on ARARs. COCs include tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, 1,2-dichloropropane, 1,2-dichloroethane, benzene, vinyl chloride, and 2-butanone (all VOCs), as well as, 3-methylphenol, 4-methylphenol, chromium, nickel, manganese, and vanadium. During the RI, these contaminants were detected at the highest concentrations at the source area, and were thought to be decreasing in concentration with distance from the landfill as a result of diffusion and natural degradation processes.

Based on the results of RI groundwater studies, it was predicted that groundwater contamination could be adequately addressed by a combination of source control (i.e., capping of the waste areas), groundwater source controls (i.e., pump and treat system to address contaminants from source area), and natural attenuation. Cap construction began in 1999, approximately five years after the RI and four years after the signing of the ROD. The ROD specified that the groundwater remedy (discussed further in Section 4.0) was to be selected based on pre-design studies conducted subsequent to the RI. Post-cap groundwater monitoring conducted during the past five years confirms the effectiveness of the cap in reducing the mass loading of contaminants to groundwater in the source area. However, monitoring data suggest there has not been a significant reduction in contaminant concentrations in the downgradient plume due to natural attenuation. Recently, chlorinated VOCs such as trichloroethene and cis-1,2-dichloroethene have been detected at significantly higher concentrations than previously detected in the area between the landfill and the Passumpsic River.

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The ROD for the Parker Landfill Site was signed on April 4, 1995. The selected remedies to address contamination at the Parker Landfill Superfund Site consist of (1) multi layer caps (including gas management) over the SWDA and IWS areas, and (2) source control groundwater extraction and treatment. The ROD also required the installation of additional groundwater monitoring wells, long-term monitoring of groundwater, surface water and sediment in the vicinity of the Site, and five-year site reviews.

The 1995 ROD describes the remedy required for the Site as follows:

- Construction of multi-layer (RCRA subtitle C) caps over the SWDA and IWS areas;

- Installation and operation of a gas collection system to reduce landfill gas accumulation and lateral migration below the SWDA and IWS areas that were capped;

- Installation of a source control groundwater treatment system to address overburden and bedrock contamination, of which the configuration was to be determined during a pre-design phase;

- Conducting long-term sampling and analysis of groundwater and sediment to assess compliance with the groundwater cleanup levels through natural attenuation and to ensure sediments in nearby surface waters have not been adversely impacted;

- Institutional controls to protect the cap, and to restrict groundwater use, including the extension of municipal water service to all homes potentially affected by contamination; and

- Review of the site every five years to evaluate the effectiveness of the remedy in ensuring the protection of human health and the environment.

<u>Cap Remedy</u>

The RAOs for the cap remedy (i.e., capping SWDA and IWS areas) are as follows:

- Minimize, to the extent practicable, the potential for transfer of hazardous substances from the soil and solid waste into the groundwater, surface water and sediment;

- Prevent direct contact/ingestion of soil or solid waste posing a potential total cancer risk greater than 10^{-4} to 10^{-6}, or a potential hazard index greater than one; and

- Comply with federal and state ARARs.

Groundwater Remedy

The RAOs for the groundwater remedy (i.e., source control groundwater treatment) are as follows:

- Prevent ingestion of groundwater containing COCs in excess of federal or state standards, or posing a potential total cancer risk greater than 10^{-4} to 10^{-6}, or a potential hazard index greater than one; and

- Comply with federal and state ARARs.

In July 2004 EPA issued an ESD for the groundwater component of the ROD remedy. The adjustment in the groundwater remedy was due to changes in the extent of the downgradient groundwater plume and the emergence of more effective treatment technologies. The ESD called for active treatment of the source area groundwater plume using a permeable reactive barrier wall, and active in-situ treatment of the downgradient plume using enhanced bioremediation.

4.2 Landfill Cap Remedy Implementation

Construction of the cap began in April 1999 and was completed in December 2001. The design components of the cap were set forth in the Landfill Cap Remedial Design Statement of Work dated November 1996. Industrial wastes and contaminated soils were excavated from IWS-2 in June 1999 and placed into the SWDA area prior to capping, eliminating the need for a separate cap over IWS-2. A continuous multi-layer cap was constructed over SWDA and IWS-1 between May 1999 and October 2000. A separate multi-layer cap was constructed over IWS-3. The landfill gas management system was constructed to control gas generated in the SWDA and IWS-1 areas (no gas recovery in IWS-3). The active gas management system consists of 17 gas extraction wells, piping and blowers, and an enclosed flare to destroy VOCs and methane. Institutional controls have been defined and have been partially implemented; however there are no current site uses that would violate the proposed institutional controls. The landfill caps have performed well since constructed. Details of the cap conditions are presented in Section 6.2 of this report.

4.3 Groundwater Remedy Implementation

The groundwater remedy was in the design phase and had not been constructed at the time of this five-year review. The 1995 ROD originally specified that the remedial action goal for groundwater is to restore groundwater at and beyond the edge of the waste areas (SWDA and IWS areas) to beneficial use as a potential and actual source of drinking water. The ROD concluded that source control remedies would include a groundwater treatment system designed to contain contamination at the source, with natural attenuation downgradient of the point of compliance. However, the ROD specified that the actual treatment technology to be implemented was to be determined during the design phase.

Pre-design studies (1995-1999) indicated that the contaminant plume had not appreciably attenuated as anticipated in the ROD, and VOC concentrations in groundwater were increasing over time in the downgradient area of the plume. Therefore, a FSA was initiated to evaluate the effectiveness of alternative technologies in addition to groundwater extraction. The FSA was completed in July 2004. Although groundwater extraction and treatment were identified as feasible and suitable technologies in the ROD, information gathered during the design phase and presented in the FSA indicated that in-situ methods of remediation, including a permeable reactive barrier and enhanced bioremediation, were viable and cost effective alternatives to groundwater extract and treat methods.

Two Pre-Design Technical Reports were completed by URS in 2003 and 2004 to evaluate the feasibility of the preferred remedial alternatives based on data gathered during pre-design field activities. The "Downgradient Pre-Design Technical Report" dated November 7, 2003, evaluates the feasibility of the use of in-situ bioremediation technology (i.e., nutrient injection) to enhance natural attenuation/biodegradation of chlorinated aliphatic hydrocarbons in the groundwater downgradient of the landfill. This report concluded that a bioenhancement technology may be effectively applied to the area of contaminated groundwater downgradient of the landfill, based on the determination that geochemical conditions observed in the study area are favorable for this technology. The nutrients recommended for application at the site, based on the pilot study, include sodium lactate (source of organic carbon), nitrogen, and phosphorus. The proposed location of the downgradient nutrient injection well field is shown in Figure 3.

The "Draft Source Area Pre-Design Technical Report" dated January 9, 2004, evaluates the feasibility of a zero-valent iron PRB wall to passively intercept the upgradient portion of the VOC-contaminated plume, and to effectively reduce concentrations of chlorinated VOCs in groundwater at the source area. This report concluded, based on column testing and bench-scale studies, that a zero-valent iron PRB would be effective in reducing concentrations of chlorinated VOCs to below IGCLs in the study area. Therefore, URS recommended full-scale design and implementation of a zero-valent iron PRB. The proposed location of the PRB is shown in Figure 3.

Limitations of the proposed groundwater remediation technologies noted in the Pre-Design Technical Reports include decreased probability of contaminant reduction if DNAPL is present. DNAPL has not been detected during site groundwater monitoring activities conducted since the cap construction. However, data collected during the RI indicated the possible presence of DNAPL in the vicinity of IWS-2. The source of the possible DNAPL (i.e., wastes and contaminated soils) was excavated from the IWS-2 area and relocated to the SWDA during cap construction. Therefore, it appears that the discrete source of DNAPL formerly measured in the IWS-2 area was diffused during landfill cap construction and further product generation was mitigated via relocation of the wastes under an impermeable cover.

The ESD was issued by EPA in July 2004. The ESD summarizes adjustments to the groundwater management component of the remedy that was originally presented in the 1995 ROD, and explains the reasons for any differences in approach. The ESD proposes a modified remedial action for groundwater at the site consisting of two components: in-situ treatment of VOC-contaminated groundwater at the source area using a zero-valent iron PRB, and the treatment of the downgradient plume via nutrient-enhanced biodegradation. The bio-enhancement technology will consist of a series of extraction and injection wells, whereby contaminated groundwater will be extracted, reagents will be added, and the supplemented groundwater will be re-injected. EPA anticipates that construction of the groundwater remedies outlined in the ESD will begin in late 2004.

Institutional controls have been partially implemented. Institutional controls will consist of easements and enforceable local or state regulations to restrict groundwater use. The area of restricted groundwater use was specified in the ROD to extend from the upgradient perimeter of the landfill to all downgradient boundaries of the contaminant plume (both in overburden and bedrock aquifers). The restricted groundwater use area includes a buffer zone around the contaminated area, to prevent potential spreading of the plume caused by drawdown in active private wells outside the area. In 2002, a municipal water line was constructed to service the residences within the proposed institutional control boundary with the exception of the Sheltra and Gidlow/Dodge residences. Water from the private wells owned by Sheltra and Gidlow/Dodge is currently sampled and analyzed quarterly to monitor for impact by site-related VOCs. At the time of this review groundwater use easements had not been obtained for four properties within the IC boundary. The reclassification of groundwater from a Class III (all groundwater) to Class IV (not potable; suitable for some industrial and agricultural use) category was established for the 119-acre area including the landfill and downgradient plume in November 2003.

5.0 FIVE-YEAR REVIEW PROCESS

This five-year review was conducted in accordance with EPA's guidance document "Comprehensive Five-Year Review Guidance", EPA 540-R-01-007, dated June 2001. Tasks completed as part of this five-year review include review of pertinent site-related documents, interviews with parties associated or familiar with the site, an inspection of the site, and a review of the current status of regulatory or other relevant standards. Site-related documents reviewed as part of this effort are listed in Attachment 2.

A fact sheet dated September 2004 was prepared by the EPA to inform the community of the five-year review.

6.0 FIVE-YEAR REVIEW FINDINGS

The information gathered during the interviews, site inspection, review of relevant standards, and site data review is described in the following subsections.

6.1 Interviews

As required in the EPA Five-Year Review Guidance Document, interviews were conducted with the VTDEC, the Town of Lyndonville, and representatives of the PRPs. Interview Record forms are provided in Attachment 3. Interviews were conducted concurrent with the site inspection on May 19, 2004. Persons attending the inspection included the remedial project manager from the EPA, representatives from the VTDEC, PRP representatives from Fairbanks Scales, Inc., Ethan Allen, Inc., and consultants for the PRPs. The names of the individuals present at the inspection/interview are recorded on a sign-in sheet attached to the Interview Record. All persons in attendance were given the opportunity to ask questions and comment on the condition of the remedy. The current condition of previously conducted erosion repairs, and the possible low water level in the wetland mitigation area were the only concerns noted.

John Schmeltzer of the VTDEC was interviewed by telephone on August 13, 2004. Mr. Schmeltzer was pleased with the condition of the cap and feels the cap is performing as intended. Mr. Schmeltzer is still concerned with the extent of gas under the mobile home park and feels that the gas needs further delineation as required in the latest EPA letter regarding the subject.

Jason Clere of URS Corporation was interviewed by telephone on August 13, 2004. URS Corporation is the consultant representing Vermont American, one of the PRPs, and designing the groundwater remedy. Mr. Clere had no comment on the condition of the cap remedy but provided information on the groundwater monitoring and remedy design and the status of a proposed residential housing development on the south side of Brown Farm Road. According to Mr. Clere, the current plan for the housing development is to provide public water in lieu of installing private drinking water wells.

On August 23, 2004, Justin Smith of the Town of Lyndonville Zoning Department was contacted regarding land development and water usage in the vicinity of the site. According to Mr. Smith, the Town has a zoning ordinance that allows development but restricts the installation and use of private drinking water wells. Existing residences and new construction on Red Village Road, Lily Pond Road, and Brown Farm Road must be connected to the municipal water supply system. Mr. Smith confirmed that the church and the proposed development on the south side of Brown Farm Road are connected to, or will be connected to the municipal water system.

6.2 Site Inspection

A site inspection was conducted on May 19, 2004, which included visual inspection of the surfaces of the SWDA and IWS-3 caps, the landfill gas management system, storm water controls, fencing, and the wetland compensation area. The site inspection was performed by an engineer (Mr. Greg Mischel, P.E.) and a wetland scientist (Mr. Jeff Park) of TRC on behalf of EPA. Other persons attending the inspection included the remedial project manager from the

EPA, representatives from the VTDEC, PRP representatives from Fairbanks Scales, Inc. and Ethan Allen, Inc., and consultants for the PRPs. The current conditions of the cap and gas management system were observed during the site inspection. Overall, the site appears in good condition. The details of the site inspection are provided in an inspection report provided in Attachment 4. The findings of the site inspection are summarized below:

- The surfaces of the SWDA landfill cap and the IWS-3 cap were in good condition with no signs of erosion, holes, cracks or bulging.

- An apparent animal burrow and associated erosion rill were observed on the steep embankment below and to the north of the IWS-3 cap. The animal should be removed and the hole and erosion repaired in order to prevent possible undermining of the IWS-3 cap.

- The slope benches and other drainage ditches were in good condition with no signs of erosion, undermining or bypass.

- The two gabion-lined downcomers, or letdown channels, on the SWDA cap were in good condition with no evident material degradation, erosion, undercutting, obstructions or vegetative growth. However, an area of settlement in Downcomer No. 2 should be monitored and repaired if the functionality of the downcomer becomes impaired, or the integrity of the cap is threatened.

- The cover penetrations through the SWDA landfill cap (17 active gas extraction wells and eight utility pole concrete vault structures) were in good condition. The buildup of ice and restriction of gas flow has been observed during winter months. The PRPs should continue to monitor the performance of the system and implement corrective actions to prevent ice buildup and gas flow restriction if the performance is affected.

- No obstructions were observed at the ends of the drainage layer outlet pipes. The crushed stone layer along the edge of the cover system appeared to be in place and did not appear to be clogged.

- The sedimentation basin was in good condition and appeared to be functioning properly.

- The perimeter and access roads of the SWDA were in good condition. Erosion was observed in the access road leading from the SWDA to the IWS-3 cap. The erosion should be repaired to maintain access to the IWS-3 area for maintenance.

- The landfill gas flare was operating at the time of the inspection. No obvious damage or changed condition was apparent.

- The wetland compensation area appears to be functioning as designed. The TRC wetland scientist and representatives of the VTDEC suggested that the water depths be increased within the wetland compensation area by elevating the weir structure to encourage habitat usage by a broader range of aquatic organisms.

6.3 Standards Review

6.3.1 ARARs

ARARs for the Parker Landfill Site were identified in the ROD (April 1995) and include the following:

- Federal SDWA MCLs and MCLGs
- Vermont Hazardous Waste Regulations
- Vermont Groundwater Protection Regulations/Groundwater Enforcement Standards (VTGES)
- Vermont Water Quality Standards
- Vermont Solid Waste Regulations
- Vermont Land Use and Development Law
- Vermont Air Pollution Control Regulations
- Federal NESHAP for Vinyl Chloride
- Federal NESHAP for Benzene Waste Operations
- Federal Noise Control Regulations
- Vermont Wetland Rules
- Vermont NPDES permit
- RCRA

Additionally, the ROD identifies the following as "To-Be Considered" criteria:

- Federal Safe Drinking Water Secondary Maximum Contaminant Levels
- Federal Safe Drinking Water Proposed MCLs
- Federal Drinking Water Health Advisories
- Federal Groundwater Protection Strategy
- Federal Interim Sediment Quality Criteria

Most of the ARARs cited in the ROD related to the design and construction of the landfill cap remedy have been met. Landfill cap ARARs that apply to the ongoing activities include Vermont Air Pollution Control Regulations; Federal NESHAP for Vinyl Chloride; Federal NESHAP for Benzene Waste Operations; and ARARs related to landfill post-closure maintenance and monitoring. These ARARs will be met with continued operation and maintenance of the landfill gas management system and landfill caps.

All of the ARARs cited in the ROD still apply to the groundwater remedy since the groundwater remedy has yet to be constructed. With the exception of the Vermont Groundwater Protection Regulations/Groundwater Enforcement Standards and the Federal SDWA, there have been no changes in the ARARs or TBCs affecting the protectiveness of the landfill cap or future protectiveness of the groundwater remedy.

IGCLs were established in the ROD for groundwater COCs. These IGCLs were equal to the Federal MCLs, Vermont standards, or risk-derived values, whichever standards were more stringent. A comparison was conducted of the IGCLs listed in the ROD with current federal MCLs and VPGQS effective January 20, 2000. The IGCLs specified in the ROD were consistent with the MCLs and VPGQS, with the exception of the current standards for PCE, acetone, hexavalent chromium and arsenic. Table 2 below compares the IGCLs specified in the ROD with the current VPGQS for those COCs whose standards have been revised.

Table 2: Vermont Groundwater Quality Standards Revised since 1995 ROD

Groundwater COC	IGCL in ROD (ppb)	Current VPGQS (ppb)	Basis of IGCL
Acetone	3,700	700	Risk based
Tetrachloroethene (PCE)	0.7	5.0	VPGQS, 1994
Hexavalent Chromium	50	100	VPGQS, 1994

As summarized above, the currently applicable VPGQS standard for acetone is lower (i.e., more stringent) than the risk-based standard specified in the ROD. The VPGQS standards for PCE and hexavalent chromium in groundwater have increased (i.e., are less stringent) from those applicable at the time of the ROD. However, it should be noted that the Vermont Action Limit Concentration for PCE remains at 0.7 ppb. The IGCL of 0.7 for PCE remains unchanged The MCL for arsenic has been changed to 0.01 mg/L per the SDWA.

As discussed in Section 6.4.4, below, acetone has been detected in downgradient and bedrock monitoring wells during recent groundwater monitoring events at concentrations that exceed the current VPGQS of 700 ppb. To ensure the future protectiveness of the remedy and compliance with Vermont cleanup levels, updating the original IGCL for acetone should be considered to meet the more stringent VPGQS standard.

6.4 Data Review

A long-term monitoring program has been implemented as required by the ROD. Based on the results of the RI, contaminants associated with the Site have been found to be present in soil (mainly below the waste areas), landfill gas, sediment, surface water and in groundwater. The ROD and the LTMP specified on-going monitoring requirements for sediment, surface water, and groundwater at the site. Figure 2 shows the locations of sediment samples, surface water samples, and groundwater monitoring wells included in the LTMP. A review was conducted of available data from the past five years for each of these media, as summarized below.

6.4.1 Sediments

As part of long-term monitoring activities required by the ROD, sampling and analysis of sediments has been performed at three locations (SD-01, SD-02, and SD-03) in the unnamed stream, once in October 2001, and on a semi-annual basis from 2002 to the present. SD-01 is located in the unnamed stream to the northeast (upstream) of the SWDA. SD-02 is located downstream of the former IWS-2 area, and immediately upstream of the intersection of a second unnamed stream that flows from the east. SD-03, considered the downstream sample, is located southwest of the site, immediately east of Red Village Road and upstream of the Passumpsic River. Samples at each location were analyzed for TCL VOCs and TAL metals in April and

October of each year. During October 2003 monitoring activities, three additional sediment samples (SD-04, SD-05, and SD-06) were collected from the Passumpsic River proximal to the confluence with the unnamed stream to evaluate impacts on the river relative to the stream.

Long-term sediment monitoring data indicate that the concentrations of VOCs and metals were generally the highest in the “upstream” samples collected from SD-01 and decreased with distance downstream.

Long term sediment quality monitoring data collected since the ROD were evaluated to determine if any significant changes in concentration had occurred since the RI. Table 3 presents the comparison of maximum concentrations detected in the long-term monitoring samples to benchmark criteria and maximum concentrations of COCs detected during the RI. The benchmark criteria are not cleanup goals but were established using available criteria and guidelines for evaluating chemical toxicity to ecological receptors. The COCs identified in the ROD include arsenic, barium, cadmium, copper, cyanide, iron, manganese, nickel, bis(2-ethylhexyl)phthalate, acetone, 2-butanone, chloroethane, chloroform, and trichloroethene. The 1993 Risk Assessment concluded that none of the COCs posed potential human health or ecological risks except for arsenic, which posed a risk assuming residential use of the site.

Since the RI, concentrations of arsenic decreased substantially in the sediments of the unnamed stream and were below the analytical detection limit in the Passumpsic sediment samples. While institutional controls will prohibit the use of the site as a residence and thus will eliminate the exposure pathway that would have resulted in unacceptable human health risk to sediments, there is a proposal to place a buffer easement along the stream to further restrict access and use of the stream on the Parker parcel.

Concentrations of four of the COCs increased slightly in the on-site sediment samples (SD-01 and SD-02) but were consistent with, or lower than, the RI maximum concentrations in the off-site sample (SD-03). While slight increases of COC concentrations were noted for the Passumpsic River samples, the concentrations were below or consistent with the concentrations detected in the RI unnamed stream sediment samples.

The 1993 ecological risk assessment concluded that barium, cyanide and manganese concentrations were slightly elevated but were unlikely to result in adverse effects to resident aquatic biota. Cyanide has been removed from the long-term monitoring program because the one sample location where an elevated concentration was detected had been disturbed during the construction of the cap. Maximum barium concentrations are lower than detected during the RI. Only the manganese concentration was higher than the maximum RI concentration but is considered not to have an adverse affect to the resident biota.

Table 3: Comparison of Sediment COC Monitoring Results from 2001-2004 vs. Sediment Results from Remedial Investigation Parker Landfill Superfund Site

Parameter (COC)	*Sediment Quality Criteria*	Unnamed Stream		Passumpsic River	
		Max. Conc. RI	Max. Conc. LTM	Max. Conc. RI	Max. Conc. LTM
VOCs					
Acetone	*0.17*	0.24	**0.91 J**	ND	**0.19**
2-Butanone	*0.91*	0.0815	**0.16**	ND	**0.059**
Chloroethane	*0.59*	0.01	ND	ND	ND
Chloroform	*0.08*	0.0054	ND	ND	ND
Trichloroethene	*5.8*	0.0054	**0.12**	ND	ND
SVOCs					
Bis(2-ethylhexyl)phthalate	*6.2*	0.3279	NA	ND	NA
Inorganics					
Arsenic	*33*	962.3	4.2	1.2	ND
Barium	*20*	809.5	125	62.1	**87.9**
Cadmium	*5*	10.5	1.4	1.2	0.07
Copper	*70*	20.7	14.2	9.3	**20.4**
Cyanide	*0.1*	22.6	NA	NA	NA
Iron	*17,000*	383,000	29,000	10,600	**21,600**
Manganese	*300*	2,425	**10,400**	1,180	947
Nickel	*30*	24.8	22.4	13.2	**32.6**

Concentrations in milligrams per kilogram (mg/kg).
Sediment Quality Criteria (mg/kg) are from 1993 Final Risk Assessment by TRC.
RI - 1990-1994 Remedial Investigation by ESE. (Maximum concentration is taken from results for 11 sediment samples on unnamed stream or 4 sediment samples on Passumpsic River.)
LTM - Long-Term Monitoring activities; conducted semi-annually from October 2001 to April 2004
NA - Not analyzed for given parameter.
ND - Not detected.
Black shading indicates result exceeds given sediment quality criteria.
Bold type indicates maximum concentration has increased since the RI.
J - Estimated

6.4.2 Surface Water

Surface water sampling along the unnamed stream has been performed at three locations on a semi-annual basis from April 2000 to the present. The locations of stream surface water samples (SW01, SW02, and SW03) were co-located with the sediment sample locations (SD-01, SD-02, and SD-3), as described in the preceding section. In addition, three, one-time only surface water samples were collected in the Passumpsic River near the confluence of the unnamed brook in October 2003. The Passumpsic River surface water samples (SW04, SW05 and SW06) were co-located with the sediment samples collected in October 2003 (SD-04, SD-05, and SD-06). Surface water samples at each sampling location were analyzed for TCL VOCs and TAL metals.

VOCs were not detected above laboratory detection limits in sample SW01, or in any of the Passumpsic River samples (SW04, SW05, SW06). TCE, vinyl chloride, cis-1,2-DCE and trans-1,2-DCE were detected in SW02 during various monitoring events. Sample SW01 had the highest overall incidence of and concentrations of metals of any of the surface water samples collected between April 2000 and April 2004. In general, there were fewer metals detected, and at decreasing concentrations, proceeding from upstream (SW01) to downstream (SW03) on the unnamed stream.

Long-term surface water quality monitoring data collected since the ROD were evaluated to determine if any significant changes in concentration had occurred since the RI. Table 4 presents the comparison of maximum concentrations detected in the long term monitoring samples to benchmark criteria and maximum concentrations of COCs detected during the RI. The benchmark criteria are not cleanup goals but were established using available criteria and guidelines for evaluating chemical toxicity to ecological receptors. The ROD identified the COCs in surface water as aluminum, antimony, barium, calcium, chromium, iron, magnesium, manganese, nickel, potassium, silver, sodium, thallium, 1,2-dichloroethene, acetone, trichloroethene and vinyl chloride. According to the ROD, all risk values for exposure to surface water were within or below EPA’s acceptable risk range. As shown in Table 4, the maximum concentrations of trichloroethene, vinyl chloride, 1,2-dichloroethene, aluminum, chromium, iron, magnesium, manganese and thallium increased since the ROD, but are in the same order of magnitude and are not considered to present an adverse impact.

The 1993 Risk Assessment concluded that aquatic biota in the unnamed stream may be impacted by elevated concentrations of iron and silver. However, surface water concentrations of silver have decreased in the unnamed stream since the RI and iron is only slightly higher (Refer to Table 4). Therefore, the potential for ecological impacts has decreased, and the potential for human exposure has been minimized by the institutional/access controls implemented at the site.

Table 4: Comparison of Surface Water COC Monitoring Results from 2000-2004 vs. Surface Water Results from Remedial Investigation Parker Landfill Superfund Site

Sampling Date		Unnamed Stream		Passumpsic River	
Parameter (COC)	***Surface Water Criteria (SW03)***	**Max. Conc. RI**	**Max. Conc. LTM**	**Max. Conc. RI**	**Max. Conc. LTM**
VOCs					
Acetone	*36.6*	0.015	0.01	NS	ND
Trichloroethene	*21.9*	0.021	**0.92**	0.006	ND
Vinyl Chloride	*10.68*	0.001	**0.0052**	NS	ND
cis-1,2-Dichloroethene	*11.6*	0.042	**0.35**	0.011	ND
trans-1,2-Dichloroethene	*11.6*	0.042	0.0024	0.011	ND
TAL Metals					
Aluminum	NP	0.116	**34.1**	0.215	**0.464**
Antimony	NP	0.0565	0.0079	NS	0.0039
Arsenic	0.15	NS	0.0127	NS	ND
Barium	NP	0.2915	0.258	0.0185	0.0151
Cadmium	0.0015	NS	0.0008	NS	ND
Calcium	NP	79.4	36.7	34.3	**35.2**
Chromium	0.0486	0.0112	**0.0523**	NS	0.0015
Cobalt	0.0058	NS	0.0199	NS	ND
Iron	1.0	33.75	**51.4**	0.611	0.598
Lead	0.0014	NS	0.0614	NS	ND
Magnesium	NP	9.375	**11.3**	NS	1.85
Manganese	NP	3.35	**6.99**	0.197	0.0745
Mercury	0.0008	NS	0.00018	NS	ND
Nickel	0.0337	0.0388	0.0323	NS	0.0019
Potassium	NP	10.04	4.78	NS	1.79
Selenium	0.0015	NS	0.0083	NS	ND
Silver	0.0014	0.0144	0.0047	NS	ND
Sodium	NP	23.55	15.1	NS	8.97
Thallium	NP	0.0016	**0.018**	NS	0.0035
Zinc	0.0758	NS	0.238	NS	ND

NS - Not summarized in ROD.
NP - Not Published
Concentrations in milligrams per liter (mg/L).
Surface Water Quality Criteria (mg/L) for VOCs are from 1993 Final Risk Assessment by TRC.
Surface water quality criteria shown is calculated value for sample location SW-03 (mg/L)
RI - 1990-1994 Remedial Investigation by ESE. (Maximum concentration is taken from results for 11 surface water samples on unnamed stream or 3 surface water samples on Passumpsic River.)
LTM - Long-Term Monitoring activities; conducted semi-annually from April 2000 to April 2004 for three locations on the unnamed stream and three locations on Passumpsic River in October 2003 only.
ND - Not detected.
Black shading indicates result exceeds given surface water quality criteria.
Bold type indicates maximum concentration has increased since the RI.

6.4.3 Groundwater Flow

Groundwater contour and potentiometric surface maps for shallow and top-of-rock/bedrock monitoring wells, respectively, as provided in annual Long-Term Monitoring Reports by URS, were compared to evaluate potential changes in groundwater flow. The groundwater contour and potentiometric surface contours presented in the 2000, 2001, 2002, and 2003 annual LTM Reports (based on quarterly water level measurements) show no significant changes in groundwater levels or groundwater flow direction within the study area during the post-cap period of October 2000 to the present.

For further comparison, water level data collected prior to the landfill cap construction (October 1998) were compared to the most recent water level data presented as contours in the 2003 annual report (October 2003). A comparison of the groundwater elevations for shallow overburden and top of bedrock wells for October 1998 and October 2003 is presented in Table 5. The elevation data for the top-of-rock monitoring wells show a distinct drop in groundwater elevations (e.g., between 1.28 and 2.94 feet) from 1998 to 2003 for wells located east and southeast of the landfill. The data for the shallow overburden wells show a more pronounced drop in shallow groundwater elevations (e.g., between 3.15 and 4.67 feet) than the top-of-rock groundwater elevations, in particular for wells located in the area directly east of the landfill (i.e., B102A, B103A, B133, and B139A/I), near the unnamed stream. The wells with the most significant drop in groundwater elevations were located on the east (opposite) side of the unnamed stream. These data indicate that the capping of the landfill not only caused decreased recharge and a drop in shallow groundwater levels in this area, but may have also caused the “losing” properties of the stream in this area (discussed in RI) to become more pronounced since cap construction.

Overall, the groundwater elevation data indicate there was an initial, minor redistribution of recharge following the construction of the cap, and that groundwater flow patterns have remained stable from 2000 to the present.

6.4.4 Groundwater Quality Monitoring

Monitoring of groundwater quality at the site has been conducted on a regular basis since 1994, prior to the construction of the cap. A LTMP was prepared for the Site in August 2000. This LTMP established a project timeline for the post-cap sampling of groundwater, surface water, and sediment samples for laboratory analysis. The long-term groundwater monitoring program was initiated in October 2000. Results of long-term monitoring activities are subsequently documented in biannual reports (with presentation of data only) by URS, and in annual Long-Term Monitoring Reports submitted to EPA by URS. During this five-year review period, groundwater, surface water, and sediments have been sampled on a quarterly (in 2000) or bi-annual schedule for a total of eleven monitoring events.

Table 5: Comparison of Pre-Cap Groundwater Elevations to October 2003 Groundwater Elevations
Parker Landfill Superfund Site

Shallow Overburden Groundwater Elevations				Top-of-Rock Groundwater Elevations			
Well I.D.	Groundwater Elevation (ft.) Oct. 16, 1998	Groundwater Elevation (ft.) Oct. 8, 2003	Change in Elevation (ft.)	Well I.D.	Groundwater Elevation (ft.) Oct. 16, 1998	Groundwater Elevation (ft.) Oct. 8, 2003	Change in Elevation (ft.)
North of Landfill				**North of Landfill**			
112A-E	781.14	781.21[B]	0.07	**112B**	705.53	699.89	-5.64
MW-8A	784.84	784.08	-0.76				
East of Landfill				**East of Landfill**			
102A	743.76	740.12	**-3.64**	**101B**	749.59	747.71	-1.88
103A	742.75	738.08	**-4.67**	**102B**	738.47	736.33	-2.14
133	737.66	733.62	**-4.04**	**103C**	723.27	720.76	-2.51
139A	731.92	727.73	**-4.19**	**132**	724.28	722.09	-2.19
139I	729.24	726.09	**-3.15**	**139B**	726.82	724.20	-2.62
South of Landfill				**South of Landfill**			
120A	691.99	690.42	-1.57	**120C**	691.79	690.35	-1.44
120B	691.95	690.39	-1.56	**121B**	692.04	689.48	-2.56
121-OW	691.95	689.46	-2.49	**122**	693.14	690.20	-2.94
MW-4A	694.34[A]	693.37	-0.97	**125A**	694.60	693.02	-1.58
136A	693.69	692.95	-0.74	**126A**	692.29	689.94	-2.35
201-OW	693.76	690.79	-2.97	**136B**	693.68	692.40	-1.28
202-OW	692.99	690.34	-2.65				
West of Landfill				**West of Landfill**			
113A	693.85	692.70	-1.15	**118B**	694.80	693.88	-0.92
118A	695.56	694.65	-0.91	**119C**	692.44	691.70	-0.74
119A	748.30	744.07	-4.23	**131C**	692.56	691.55	-1.01
119B	692.38	691.64	-0.74	**137B**	693.82	692.73	-1.09
131B	692.52	691.60	-0.92	**138B**	693.53	692.66	-0.87
137A	693.79	692.79	-1				
138A	693.62	692.65	-0.97				
MW-6A	693.83	692.80	-1.03				

A - Feb. 24, 1999 data used; No data available for Oct. 16, 1998.

B - July 23, 2003 data used; No data available for Oct. 8, 2003.

While as many as 100 groundwater monitoring wells were once present in the vicinity of the Site, the LTMP reduced the number of wells subjected to periodic groundwater sampling and analysis to 40 of the wells present prior to cap construction, plus an additional eight wells that were installed during/after cap construction and subsequently added to the LTM program. The groundwater monitoring well network being utilized for groundwater monitoring includes wells screened within three distinct subsurface "zones of interest". Shallow overburden monitoring wells, with screened intervals intercepting the groundwater table have the suffix "A", "S", or "OW" after their location designation. Monitoring wells with screens intercepting the top of the bedrock interface are termed "top-of-rock" wells, and typically end with the suffix "B", "C", or "R". The bedrock monitoring wells, with screened intervals below the bedrock, typically end with the suffix "B", "C", or "D". Laboratory analyses for samples collected in LTMP wells have included TCL VOCs, TCL SVOCs, and TAL metals. In addition, geochemistry parameters (e.g., temperature, pH, dissolved oxygen, specific conductance, and turbidity) have been measured and recorded at each LTMP groundwater sampling point.

Of the 48 groundwater monitoring wells sampled as part of the LTM program to date, nearly all of the wells have contained contaminant concentrations exceeding applicable IGCLs for metals and/or VOCs. LTMP groundwater quality data for February 2000 to April 2004 were reviewed and trends in the data are summarized below.

6.4.4.1 Metals Trends

The ROD identified arsenic, antimony, beryllium, chromium, manganese, nickel, and vanadium as COCs. Recent monitoring data indicate chromium, lead, manganese, nickel, thallium, and vanadium currently exceed the IGCLs. The data from the last three monitoring rounds (April 2003, October 2003, and April 2004) indicate that concentrations of metals exceed IGCLs at no more than ten well locations. These data indicate a prevalence of elevated concentrations of vanadium and manganese (above IGCLs) versus other metals among overburden, top-of-rock, and bedrock wells. The recent distribution of elevated metals concentrations in the shallow overburden appears to be concentrated more in the vicinity of IWS-3 and IWS-1, while concentrations in the top-of-rock and bedrock well networks appear to be more widely and evenly distributed. Concentrations of metals in groundwater, overall, appear to be decreasing over time.

Recent exceedances of IGCLs for metals in the shallow overburden aquifer appear to be localized in the on-site areas immediately downgradient of IWS-3 and IWS-1. For example, exceedances of IGCLs for metals were observed in shallow overburden wells B102A, B103A, B133 (downgradient of IWS-3) and B138A (downgradient of IWS-1) in April 2003. Vanadium exceeded IGCLs in three of the four overburden wells exhibiting exceedances for metals in April 2003 (B139A, B102A, and B103A). Exceedances of IGCLs were also detected in April 2003 for chromium (B138A and B102A), nickel (B138A and B102A), and lead, manganese, and thallium (B102A). In October 2003, exceedances of IGCLs for metals were observed in the same three wells downgradient of IWS-3 (B102A, B103A, B133), B113A (downgradient of IWS-1) and B201-OW.

Exceedances of IGCLs for metals (mainly manganese and vanadium) have been more widely distributed among the top-of-rock monitoring wells but are still confined to the site. During the April 2003, October 2003, and April 2004 monitoring events, concentrations of metals other than manganese and vanadium exceeding IGCLs were detected at only one or two wells per event. For example, in April 2001, exceedances for thallium (B119C and B139B), and chromium, lead, and nickel (B139B) were detected, and in October 2003, chromium and nickel at one location (B102B) were the only other metals exceeding IGCLs among the top-of-rock wells. Results were consistent in April 2004, with chromium and/or nickel exceedances detected at two top-of-rock wells in the vicinity of IWS-3 (B102B and B139B). IGCL exceedances during the last three monitoring rounds for metals in bedrock monitoring wells were limited to manganese and vanadium only.

6.4.4.2 SVOCs Trends

During the past three monitoring events, only one SVOC, 3-methylphenol/4-methylphenol, has exceeded IGCLs in a total of three wells located to the east and southeast of the landfill (B113B, B131C, and B138B). Historically 3-methylphenol/4-methylphenol and/or 4-methylphenol have been detected in these wells since 2000. The COC list for SVOCs includes both 4-methylphenol and bis(2-ethylhexyl)phthalate; however, bis(2-ethylhexyl)phthalate has not been detected in any of the monitoring wells during the routine sampling events conducted since February 2000.

6.4.4.3 VOCs Trends

VOCs are the primary constituents of concern at the site, due to their prevalence and mobility over other contaminants in groundwater. Up to nine different VOCs have been detected at concentrations exceeding IGCLs during the last three monitoring events (April 2003, October 2003, and April 2004). These VOCs consist of benzene, 2-butanone, cis-1,2-dichloroethene, 1,2-dichloroethane, 1,2-dichloropropane, methylene chloride, trichloroethene, tetrachloroethene, vinyl chloride. In general, cis-1,2-dichloroethene (cis-1,2-DCE), TCE and PCE have the highest incidence of detection in groundwater during recent monitoring events. The proposed groundwater remediation approach for site groundwater, as discussed in Section 4.3, targets VOCs. Figure 4 indicates increasing or decreasing VOC concentrations trends for groundwater monitoring wells and VOCs for which exccedances of IGCLs were detected during the April 2004 monitoring event.

Data for VOCs in shallow and top-of-rock monitoring wells was reviewed for the monitoring period of February 2000 to April 2004 to determine the distribution of VOCs and changes in their concentrations over time. For shallow overburden monitoring wells, the distribution of VOCs has been more limited in extent than VOCs in the deep (top-of-rock/bedrock) aquifer. VOCs have consistently been detected in shallow overburden wells in the immediate vicinity of the landfill (B138A), downgradient of IWS-3 (B103A, B133, and B139A), and downgradient of the former IWS-2 area (B136A, B126S and MW-4A). Concentrations of VOCs in the shallow overburden wells remained somewhat stable since 2000. For example, TCE concentrations in B136A (downgradient of IWS-2) have remained constant at around 0.01 mg/L since October 2000, and have been consistently below the IGCL at B120A which is further downgradient and adjacent to the Riverside School.

For the top-of-rock monitoring wells, the distribution of VOCs is more widespread than in the shallow wells. Top-of-rock monitoring wells in which VOCs have been detected at concentrations exceeding IGCLs are generally downgradient of the industrial waste areas (IWS-1, IWS-3, and to a lesser extent, the former IWS-2 area). For example, during the three most recent monitoring events, VOCs exceeded IGCLs at monitoring wells downgradient of IWS-3 (B132), downgradient of the former IWS-2 area (B120C, B125A, B126A, B132, and B136B), and downgradient of IWS-1 (B113BB and 138B).

Based on Trend Plots presented in the 2003 Long Term Monitoring Report by URS and in the July 2004 Alternative Technology Analysis and Evaluation by URS, concentrations of some VOCs appear to show increasing trends in top-of-rock and bedrock wells, while other VOCs show decreasing trends, depending upon location and distance from the source areas. Figure 4 identifies the apparent trend for the VOCs that exceeded ICGLs during the April 2004 sampling event. Concentrations of 1,1-DCA and cis-1,2-DCE both appear to be decreasing in B113BB and B138B (downgradient of IWS-1 and the SWDA cap). However, concentrations of vinyl chloride and 2-butanone appear to have a general increasing trend in these wells over time. At B132 and B132B (downgradient of IWS-3), concentrations of cis-1,2-DCE, 1,1-DCA, TCE, and PCE all show a general decreasing trend over time. However, VOC concentrations show a general increasing trend over time at monitoring wells located further downgradient from the landfill (B125B and B136B) and near the leading edge of the VOC plume (B120C, B126A/B, and B145B).

6.4.4.3.1 Extent of VOCs in Groundwater

Delineating the extent of the VOC plume in groundwater is important for the design of the groundwater remedy and implementation of institutional controls. The extent of the VOC contaminant plume has been defined in documents pertaining to the groundwater remedy as the limits of the area in which VOCs exceed IGCLs in groundwater. The most recent (April 2004) data were reviewed to identify where new IGCL exceedances were outside the limits of the plume used to design the remedy and define the limits of the institutional controls. No IGCL exceedances for VOCs were identified beyond the limits of the plume used to design the remedy.

In November 2003, groundwater at the site was reclassified from Class III to Class IV, and a Groundwater Reclassification Area was delineated based on the area of IGCL exceedances defined from October 2000 data. During the period of monitoring since October 2000, the boundaries of the IGCL exceedance area appear to have remained generally consistent, based on IGCL Exceedance Distribution Maps presented in each Annual LTM Report by URS.

One recent exception was noted for the IGCL exceedance area in bedrock wells for October 2003. The boundaries of the IGCL exceedance area for bedrock, as defined in Figure 18 of the Draft 2003 LTM Report by URS, appear to extend into the 200-foot buffer zone of the Groundwater Reclassification Area. Specifically, the bedrock and top-of rock IGCL exceedance boundaries for October 2003 are shown to extend to the west, past the B145B/C monitoring wells, where exceedances of 1,2-dichloropropane were detected in October 2003.

This information indicates that the limits of the buffer zone of the Groundwater Reclassification area may encompass areas of recent IGCL exceedances for top-of-rock and bedrock aquifers, but that the actual 2001 Groundwater Reclassification boundary may not, especially given the possibility the deep aquifer outlying the reclassification area buffer zone may be utilized for potable water.

6.4.4.3.2 1,4-Dioxane

During the April 2004 monitoring event, groundwater samples from a subset of 21 monitoring wells were analyzed for 1,4-dioxane, a solvent additive typically associated with 1,1,1-TCA which is not included in the standard analyte lists for the LTM Program. Based on the current monitoring well network, an evaluation of the extent of the 1,4-dioxane plume versus the extent of 1,1,1-TCA was made. The mobility of 1,4-dioxane in the environment is greater than 1,1,1-TCA, and therefore, it is anticipated that the plume may be larger. The extent of 1,4-dioxane has not been fully evaluated based solely on the April 2004 data. Therefore, there is the potential that the 1,4-dioxane plume extends beyond the boundary of the proposed Groundwater Reclassification Area. The highest concentration of 1,4-dioxane was detected in B113BB, located immediately south of the SWDA, and the second highest concentration was detected in the monitoring well located furthest from the landfill (B126A). Additional monitoring of groundwater for 1,4-dioxane will be necessary, and may require the monitoring of additional existing monitoring wells and/or the installation and monitoring of new groundwater wells.

6.4.5 Landfill Gas

The concentration of landfill gas is monitored at gas extraction wells within the SWDA landfill and off-cap gas monitoring probes. The crawl spaces beneath the mobile homes to the north west of the landfill have also been monitored in the past for the presence of landfill gas. The gas extraction wells are monitored weekly for flow rate, temperature, vacuum, and the concentrations of methane, carbon dioxide and oxygen. The data are used to balance the landfill gas management system by optimizing methane gas collection and minimizing the rate at which oxygen is pulled into the waste from the atmosphere. Excess oxygen can result in spontaneous combustion of the waste and subsurface fires. Monitoring data indicate the landfill gas management system is properly balanced.

Subsurface gas monitoring probes have been installed mainly in the northwest portion of the site to define the extent of landfill gas beyond the boundary of the SWDA landfill. The 27 gas monitoring locations are broken into three classifications that require different monitoring frequencies. In addition, two or more wells are installed at some of the monitoring locations in order to define the vertical distribution of landfill gas. The subsurface investigations conducted during the installation of the probes indicate there are two separate zones beneath the mobile home park, shallow and deep, where landfill gas has been shown to migrate. The zones are separated by a fine-grained silt layer that appears to act a leaky confining layer that retards the vertical migration of landfill gas from the deep zone into the shallow zone.

Probe monitoring data indicate higher and more sustained concentrations of methane have been detected in the deep zone while the detections in the shallow zone have been generally lower and intermittent. The data also show a strong correlation between periods of low barometric pressure and the presence of landfill gas in both zones. The low barometric pressure creates a pressure differential between the landfill waste and the surrounding soils causing gas to migrate from the high pressure (landfill waste) to low pressure (surrounding soils). The rise and fall of the barometric pressure results in a pulsing of landfill gas into the soils below the mobile homes. It is not clear at this time whether the gas in the shallow zone is the result of vertical migration from the deep zone or lateral migration directly from the landfill. In either case, gas in the shallow zone has the most potential to migrate upward into the crawl spaces beneath the mobile homes, or the interior of the mobile homes where the gas could cause an explosion hazard.

The PRP is currently hand monitoring two shallow probes (GP-21B and GP-22B) on a daily basis. Two levels of contingency are currently in place to protect the safety of the mobile home residents. A concentration above 20% of the LEL triggers expanded monitoring to define the extent of the gas plume until concentrations subside. A concentration of 50% of the LEL triggers expanded monitoring of the mobile homes to determine if explosive concentrations are present.

Figure 5 shows the highest concentrations of methane in the deep and shallow zones since January 2003. The Figure indicates that the lateral extent of the deep and shallow gas has yet to be defined to the west and north of the mobile home park. In response to a letter from the EPA dated August 12, 2004, the PRPs are currently planning to install additional gas probes in late 2004 to define the extent of the deep and shallow gas.

In general, the methane concentrations in landfill gas probes have declined since weekly balancing and optimization of the landfill gas management system started in January 2003. Figure 6 shows the daily methane concentration in percent of LEL as measured in the shallow probe with the highest, and most consistent detections (GP-21B). The barometric pressure and fourth order polynomial trend lines were added for comparison. The graph shows an overall decrease in concentration with what appears to be a seasonal increase in concentrations during the winter months. The corresponding deep gas probe, GP-21A shows a similar trend in gas concentration (Figure 7).

To date methane has not been detected in the crawl spaces below the mobile homes, even when the concentration of methane in the shallow gas probes exceeded 50% LEL. Therefore, the performance standard for the landfill to maintain gas concentrations to 25% of the LEL in the shallow soil below the mobile homes and 100% LEL at the landfill boundary is protective. The 25% LEL standard represents a factor of safety of 4 against explosion in subsurface structures. The factor of safety should be higher for the crawl spaces due to the dispersion of the gas when it enters the atmosphere. Continued monitoring is critical to ensuring the remedy is protective in the future.

7.0 TECHNICAL ASSESSMENT

7.1 Landfill Cap Remedy

Question A: Is the Landfill Cap Remedy functioning as intended by the decision documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicate that the landfill cap remedy is functioning as intended by the ROD. The capping of the SWDA and IWS-3 has achieved the remedial objectives of minimizing, to the extent practicable, the potential for transfer of hazardous substances from the soil and solid waste into the groundwater, surface water and sediment; and to prevent direct contact/ingestion of soil or solid waste posing a potential total cancer risk greater than 10^{-4} to 10^{-6}, or a potential hazard index greater than one. However, due to the fact that institutional controls have yet to be finalized for the property, the remedy, as prescribed in the ROD has not yet been fully implemented. This does not impact the remedy's protectiveness at this time since no one is currently using the site or associated contaminated water. However, should the institutional controls not be finalized, this could impact the remedy's protectiveness in the future.

The landfill gas management system was designed and constructed in accordance with the Landfill Cap RD Statement of Work dated November 1996 and standard engineering practice. While the performance standard for the gas management system is to protect the potentially exposed individuals and comply with federal and state regulation, there has been some concern with the ability of the landfill gas system to achieve the ROD objective of preventing lateral migration of landfill gas. The point of compliance for air, consistent with the NCP, shall be the point(s) of the maximum exposed individual, considering reasonable expected used of the Site and surrounding area. The maximum exposed individuals include: (1) adjacent residents; (2) operation and maintenance personnel; and (3) individuals working at the facility. The gas collection system is successful in preventing an unacceptable risk of exposure to the maximum exposed individuals by controlling the release of landfill gas and treating collected landfill gas. The gas collection and treatment system also complies with federal and state air regulations. The lateral migration of landfill gas appears to be related to barometric pressure. To date methane has not been detected in the crawl spaces below the mobile homes and monitoring data indicate that the frequency of detection, and concentration of methane in the subsurface has declined over time. Current daily monitoring of the shallow gas probes provides sufficient warning to allow evacuation of the mobile home residents prior to the development of explosive conditions. The extent of the lateral gas migration has yet to be defined. Additional gas probes are scheduled to be installed in late 2004 for this purpose.

Operation and maintenance of the caps and landfill gas management system has been effective. Minor issues as identified in the site inspection continue to be addressed adequately. The landfill gas management system is the only component of the cap remedy that offers the possibility of optimization. The landfill gas management system is continually optimized during weekly site visits.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

The exposure pathways and receptor populations identified in the risk assessment are still valid. There have been no changes in the physical condition of the site that would affect the protectiveness of the cap remedy. The landfill caps continue to prevent exposure to contaminated soils and solid waste. There were no cleanup levels established for the landfill cap remedy. The remedial action objectives used at the time of remedy selection are still valid.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

From all of the activities conducted as part of this five-year review, no new information has come to light which would call into question the protectiveness of the landfill cap remedy. No new human or ecological receptors have been identified at this time. No evidence of damage due to natural disasters was noted during the site inspection.

7.2 Groundwater Remedy

Question A: Is the Groundwater Remedy functioning as intended by the decision documents?

To date, the groundwater remedy has not been constructed, but is scheduled to be constructed in the Fall of 2004.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Changes in exposure assumptions

The exposure pathways and receptor populations identified in the risk assessment are still valid.

Changes in Risk Assessment Methodologies

The original risk assessment for the site does not evaluate childhood exposures to groundwater as is currently done for USEPA Region I. However, this is unnecessary due to the lack of an exposure pathway.

An exposure pathway that was not previously evaluated has been identified and was evaluated by URS Corporation in July of 2003. This pathway is a vapor intrusion pathway, which if complete, could result in groundwater contaminants in the vapor phase moving through the vadose zone and entering buildings through cracks or preferential pathways. However, the July 2003 study determined the pathway was incomplete due to the presence of clean groundwater between the deep groundwater plume and the vadose zone.

Changes in Constituents of Concern

A potential new constituent of concern has been identified in the groundwater at the site. 1, 4-dioxane is a common solvent stabilizer used with 1, 1, 1- TCA based degreasers. Further discussion of 1, 4-dioxane is presented in TRC's Technical Memorandum dated January 27, 2004, entitled, "Technical Memorandum: Evaluation of 1,4-dioxane in Ground Water at Parker Landfill". TCA was detected during the Remedial Investigation at concentrations up to 850 ppb. Recent (April, 2004) groundwater sampling for 1,4-dioxane resulted in detected concentrations ranging from 0.67 ppb to 160 ppb. 1,4-dioxane is classified as a B2 carcinogen with a slope factor of 1E-02 per mg/kg-d, based upon the induction of nasal cavity and liver carcinomas in multiple strains of rats, liver carcinomas in mice, and gall bladder carcinomas in guinea pigs. Concentrations of 1, 4-dioxane have been detected at concentrations above the VPGQS of 20 ppb (see June 22, 2004 from URS Corporation to Ms. Leslie McVickar, USEPA, Region I). Continued monitoring of 1,4-dioxane will be necessary.

Changes in Toxicity Criteria

Some toxicity values used to calculate the noncancer hazards and cancer risks have changed since the risk assessment was completed. Some toxicity values have increased while others have decreased (see Tables 1 and 2 in Attachment 5 for the current toxicity criteria for carcinogens and non-carcinogens, respectively). Other than the change in toxicity criteria for TCE, the changes are not substantive and do not affect the protectiveness of the remedy.

Changes in Standards and To Be Considered

Interim cleanup levels have been established in groundwater for all contaminants of concern identified in the Baseline Risk Assessment found to pose an unacceptable risk to either public health or the environment. The interim cleanup levels for groundwater have been set based upon the ARARS (e.g., Federal Drinking Water MCLGs and MCLs, and Vermont Groundwater Quality Standards) as available, or other suitable criteria.

A comparison of the interim groundwater cleanup levels listed in the ROD with current federal MCLs and state groundwater protection criteria was conducted (see Table 3 in Attachment 5). The current groundwater protection criteria for tetrachloroethene, chromium (as hexavalent) and manganese have increased above the values presented in the ROD. Tetrachloroethene has increased from 0.0007 mg/L to 0.005 mg/L, and chromium has increased from 0.05 mg/L to 0.1 mg/L. The interim clean up value for manganese was 0.180 mg/L and was a calculated risk-based value. Due to the change in the RfD for manganese the risk-based level has increased to 0.84 mg/L. It should be noted however that Vermont has a secondary VPQGS for manganese of 0.05 mg/L. Per Chapter 12: Ground Water Protection Rule and Strategy (State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, January 20, 2000):

> "An activity shall not cause the ground water quality to reach or exceed the secondary enforcement standards or 110% of the secondary background ground water quality standards established under 12-704, whichever is greater"

The current protection criterion for acetone has decreased from the values presented in the ROD. Acetone's interim clean-up level was a calculated risk-based value of 3.7 mg/L due to the lack of federal or state criteria. The current VPQGS for acetone is 0.7 mg/L. The MCL for arsenic has changed to 0.01 mg/L per the SDWA. Other values listed in the ROD are current.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified that would call into question the protectiveness of the remedy.

8.0 ISSUES

Based on the activities conducted during this Five-Year Review, the issues identified in Table 6 have been noted:

Table 6: Issues		
Issues	**Affects Current Protectiveness**	**Affects Future Protectiveness**
In accordance with the ROD, institutional controls were to be implemented as part of the selected remedy. To date the institutional controls for the site have not been finalized.	N	Y
Landfill gas is currently migrating into the subsurface of the mobile home park during low barometric conditions. The extent of the gas has not been defined. Continued monitoring is critical to ensure future protectiveness.	N	Y
The groundwater remedy has not yet been constructed.	N	Y
The VPGQS for acetone was revised and is currently more stringent than during the ROD.	N	Y
1,4-dioxane was recently detected in site groundwater above VPGQS but not evaluated in the risk assessment.	N	Y

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In response to the issues noted above, it is recommended that the actions listed in Table 7 be taken:

Table 7: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Institutional Controls	Finalization of institutional controls for the Site	PRP	EPA/VTDEC	9/05	N	Y
Landfill Gas	Install new gas probes to define extent, and continue monitoring	PRP	EPA/VTDEC	9/05	N	Y
Construction of groundwater remedy	Construct the groundwater remedy	PRP	EPA/VTDEC	9/05	N	Y
Updated VPGQS for Acetone	Evaluate need to update IGCL and consider effects on proposed treatment technologies	PRP	EPA/VTDEC	TBC	N	Y
1,4 Dioxane	Continue to monitor and define the extent of 1,4-dioxane to ensure the plume is within the groundwater ICs	PRP	EPA/VTDEC	TBC	N	Y

10.0 PROTECTIVENESS STATEMENT

The remedy at the Parker Landfill Site currently protects human health and the environment because there is no current use of or exposure to site media containing contaminant concentrations exceeding applicable criteria. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Finalize the institutional controls;
- Continue operation and maintenance of the cap remedy;
- Install gas probes to define the extent of landfill gas and continue monitoring;
- Construct the groundwater remedy;
- Evaluate the need to update the IGCL for acetone and consider effects on proposed groundwater treatment technologies;
- Continue 1,4-dioxane analysis of groundwater samples in LTMP wells and consider effects on proposed groundwater treatment technologies and need for additional monitoring wells;
- Over the next five-year review period, continue the sampling and analysis program as performed during the first five-year review period; and
- Consider updating the institutional control boundary to include wells with new exceedances of IGCLs.

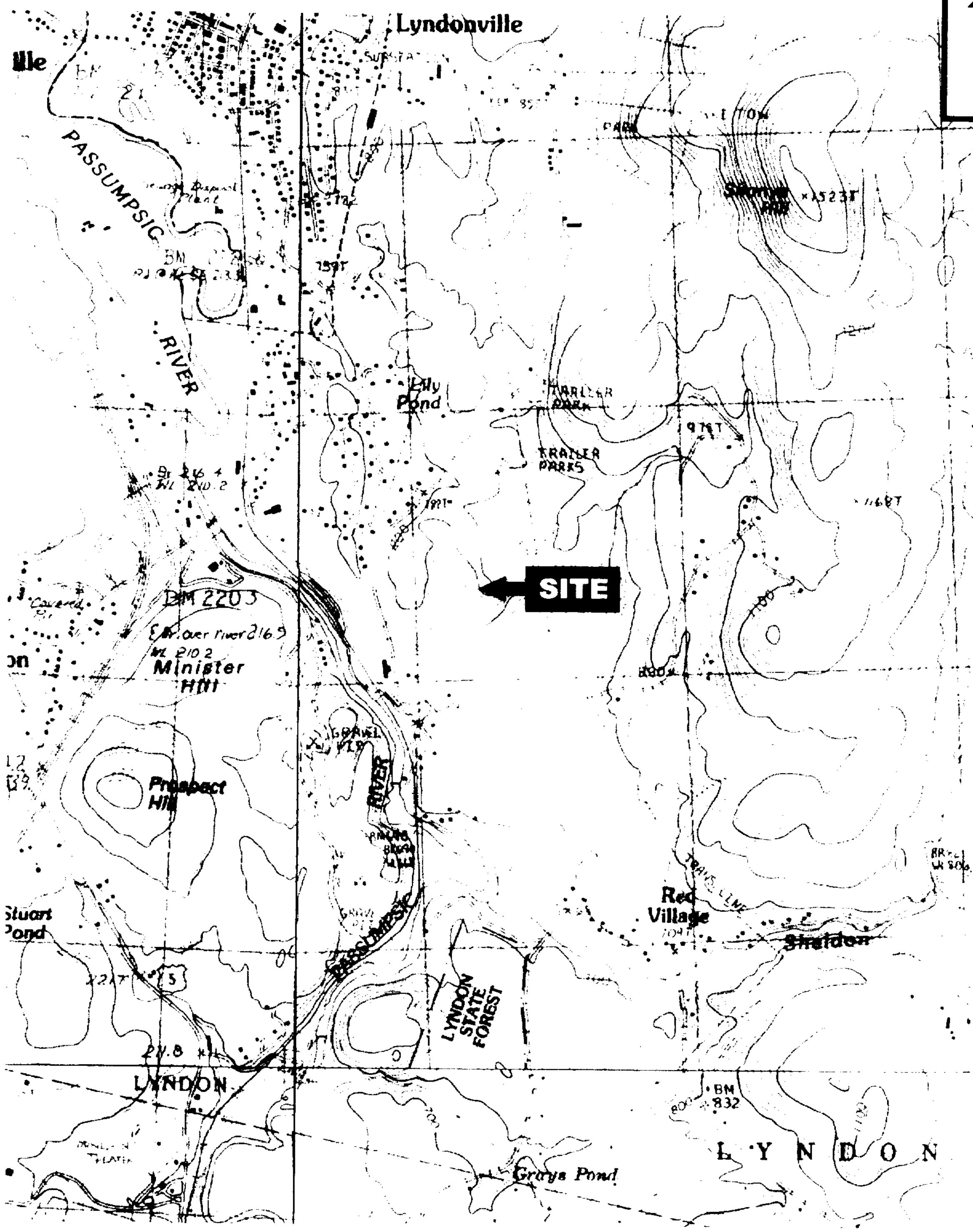
11.0 NEXT REVIEW

The due date for this first five-year review of the Parker Landfill Site is September 30, 2004. Therefore, the next five-year review should be completed by September 30, 2009. The next review should include a complete review of data generated under the long-term monitoring program to evaluate the effectiveness of the groundwater remedy, and confirm that the 1,4-dioxane plume is within the groundwater reclassification boundary. The next review should also include an evaluation of institutional controls for the site once they are finalized.

ATTACHMENTS

ATTACHMENT 1

SITE MAPS AND FIGURES



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' USGS TOPOGRAPHIC QUADRANGLES: BURKE MOUNTAIN, VERMONT 1988; LYNDONVILLE, VERMONT 1986

0 1000 2000 3000

scale in feet

Originals in color.

FIGURE 1

SITE LOCATION MAP

PARKER LANDFILL
LYNDONVILLE, VERMONT

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

VT

TRC PROJ NO 02136-0530-10102

EPA CONTRACT NO. 68-W6-0042

RAC SUBCONTRACT NO. 107061

02136/MULTI-SITE 5-YEAR REVIEW/PARKER LANDFILL/TOPO

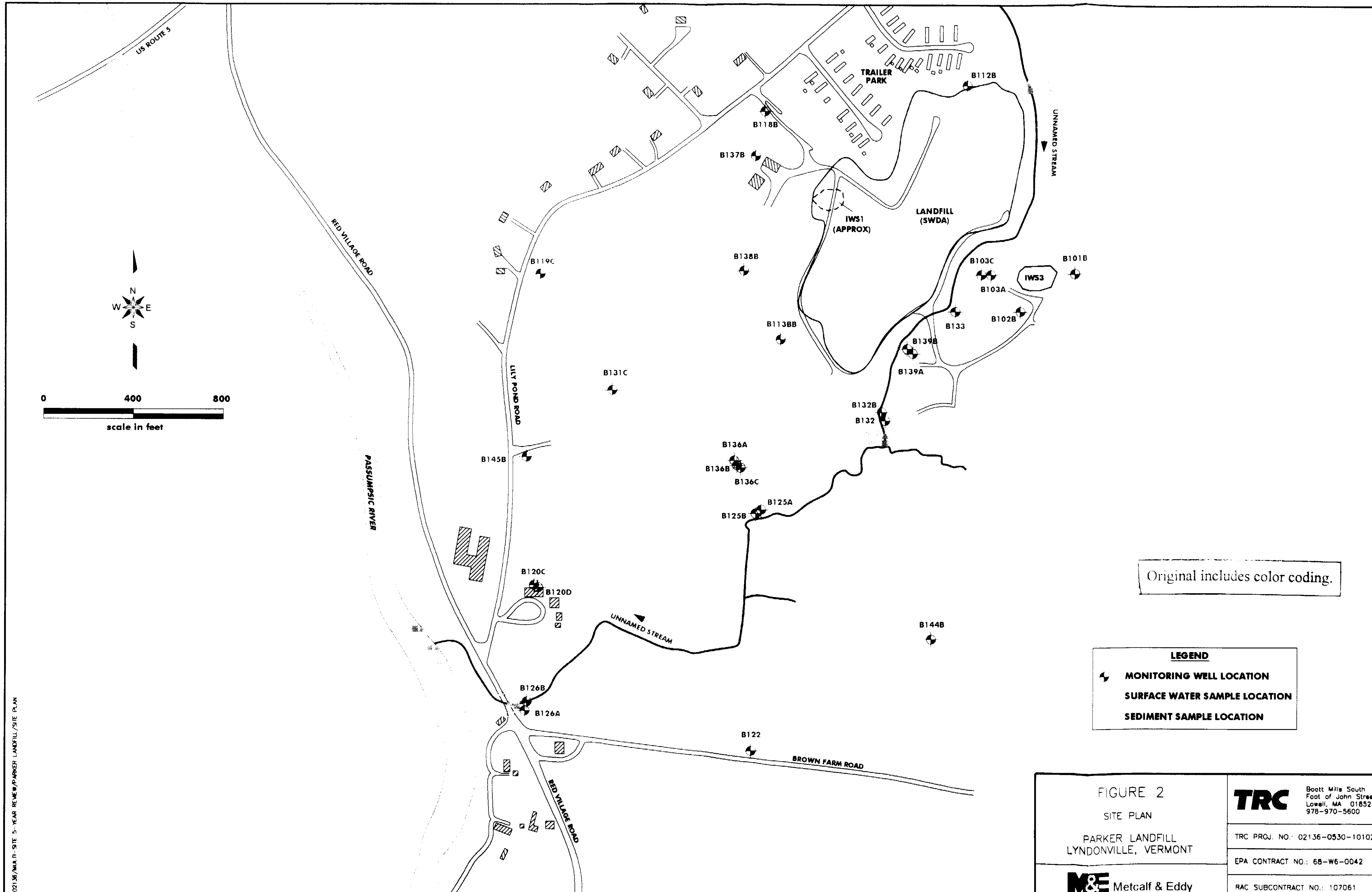
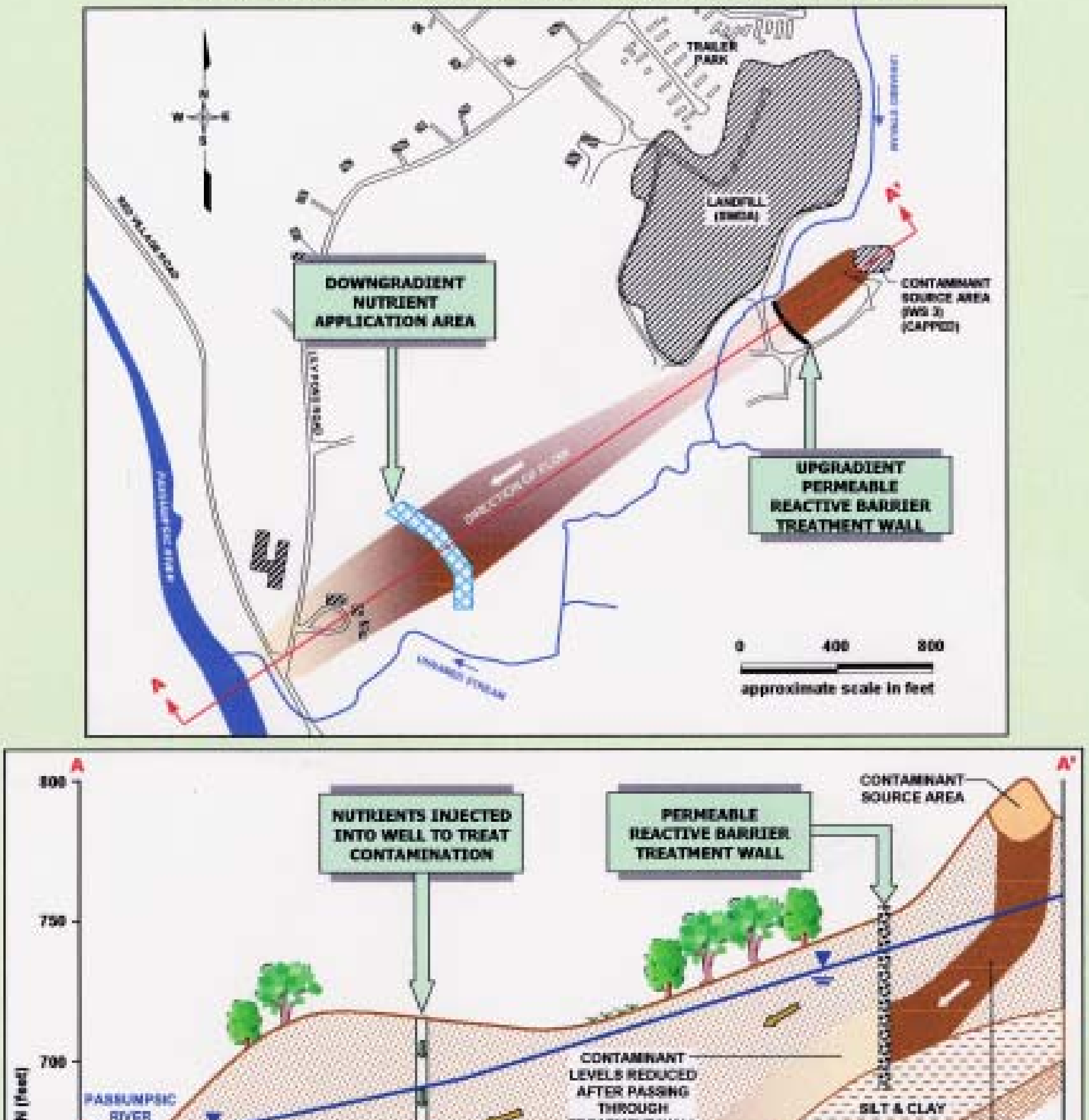


FIGURE 2

SITE PLAN

PARKER LANDFILL
LYNDONVILLE, VERMONT

Groundwater Remediation Approach



Originals in color.

FIGURE 3
GROUNDWATER REMEDIATION APPROACH
PARKER LANDFILL
LYNDONVILLE, VERMONT

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02130-0030-10182

EPA CONTRACT NO.: 68-W9-0043

RAC SUBCONTRACT NO.: 107001

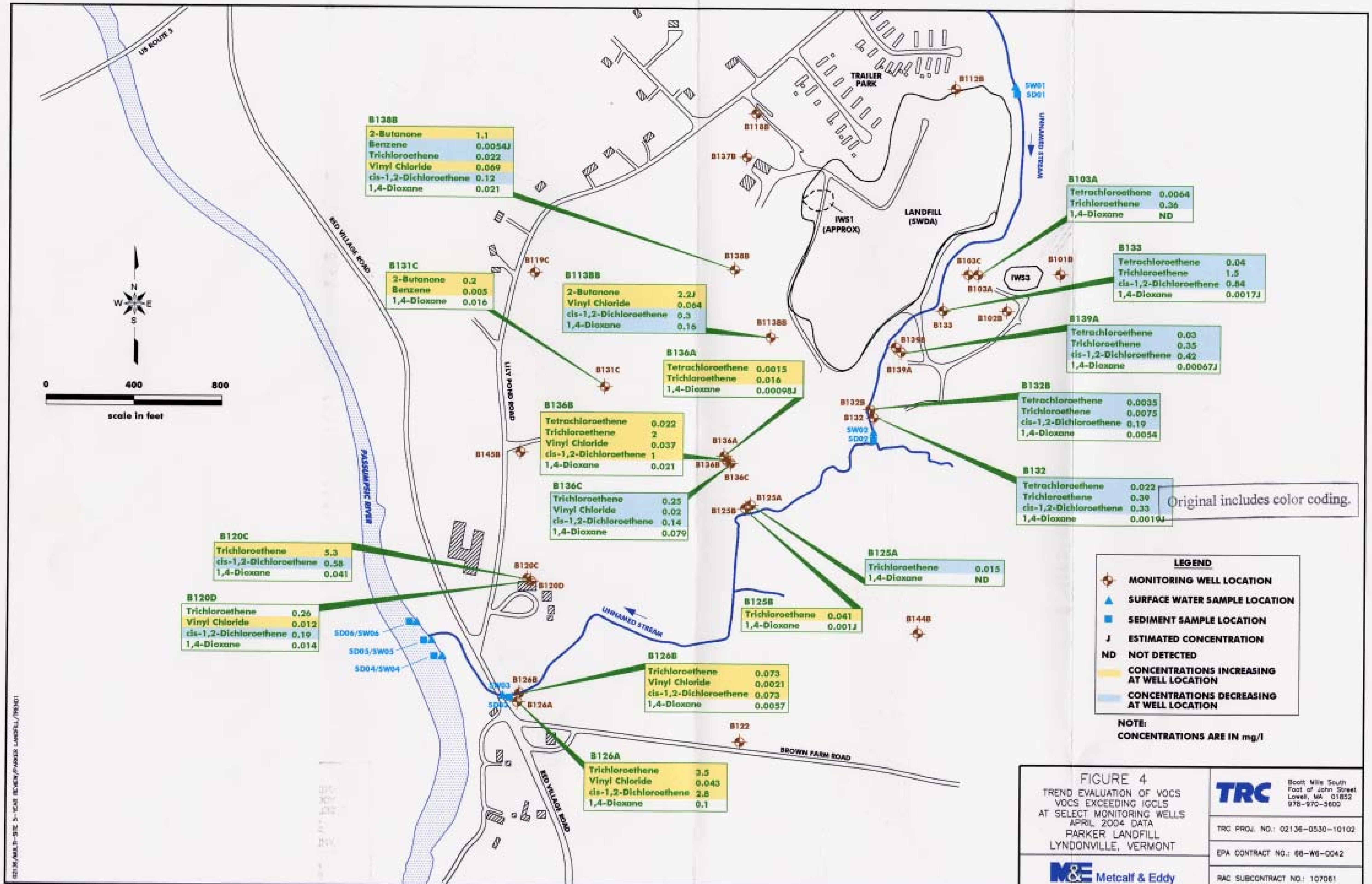
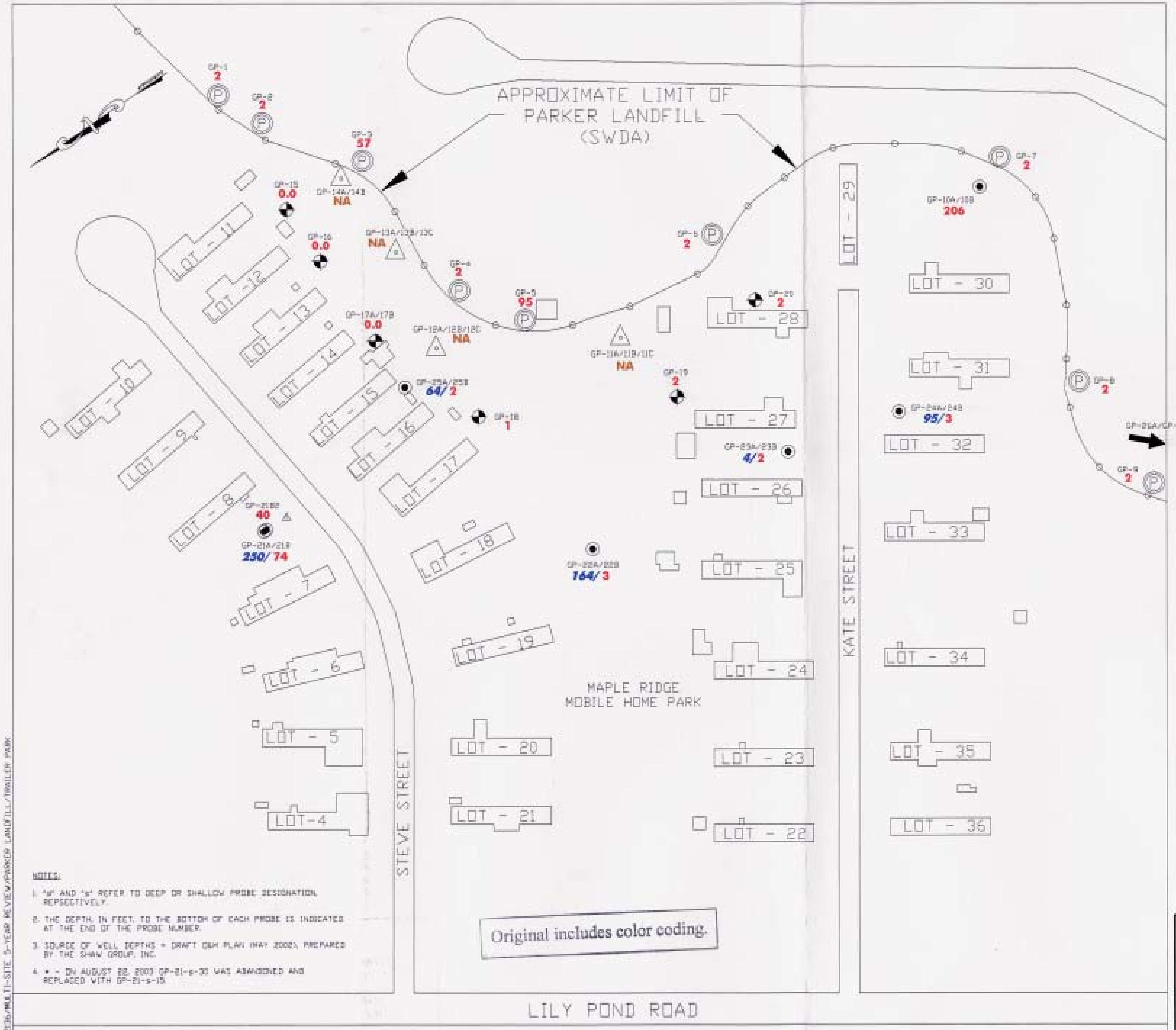


FIGURE 4
TREND EVALUATION OF VOCS
VOCS EXCEEDING IGCLS
AT SELECT MONITORING WELLS
APRIL 2004 DATA
PARKER LANDFILL
LYNDONVILLE, VERMONT



NOTES:

1. "d" AND "s" REFER TO DEEP OR SHALLOW PROBE DESIGNATION, REPSECTIVELY.
2. THE DEPTH, IN FEET, TO THE BOTTOM OF EACH PROBE IS INDICATED AT THE END OF THE PROBE NUMBER.
3. SOURCE OF WELL DEPTHS = DRAFT O&M PLAN (MAY 2002), PREPARED BY THE SHAW GROUP, INC.
4. * - ON AUGUST 22, 2003 GP-21-s-30 WAS ABANDONED AND REPLACED WITH GP-21-s-15

LEGEND

GP-25A/25B APPROXIMATE LOCATION OF CORE PROBE AND DESIGNATION

GP-1 APPROXIMATE LOCATION OF PERIMETER PROBE AND DESIGNATION

GP-15 APPROXIMATE LOCATION OF COMPLIANCE PROBE AND DESIGNATION

GP-14B APPROXIMATE LOCATION OF GAS PROBE AND DESIGNATION

250 PERCENT LEL IN DEEP ZONE

74 PERCENT LEL IN SHALLOW ZONE

NA DATA NOT AVAILABLE

PROBE DESIGNATION LEGEND

GP-1	GP-01-s-20
GP-2	GP-02-s-20
GP-3	GP-03-s-16.7
GP-4	GP-04-s-8.5
GP-5	GP-05-s-12
GP-6	GP-06-s-12
GP-7	GP-07-s-18.5
GP-8	GP-08-s-6.5
GP-9	GP-09-s-6
GP-10A	GP-10-d-60
GP-10B	GP-10-s-35
GP-11A	GP-11-d-85
GP-11B	GP-11-d-60
GP-11C	GP-11-s-30
GP-12A	GP-12-d-85
GP-12B	GP-12-d-60
GP-12C	GP-12-s-30
GP-13A	GP-13-d-85
GP-13B	GP-13-d-60
GP-13C	GP-13-s-30
GP-14A	GP-14-d-84
GP-14B	GP-14-s-30
GP-15	GP-15-s-14
GP-16	GP-16-s-14
GP-17A	GP-17-s-18
GP-17B	GP-17-s-8
GP-18	GP-18-s-15
GP-19	GP-19-s-15
GP-20	GP-20-s-15
GP-21A	GP-21-d-62
GP-21B	GP-21-s-30
GP-21B2	GP-21-s-15
GP-22A	GP-22-d-83
GP-22B	GP-22-s-30
GP-23A	GP-23-d-95
GP-23B	GP-23-s-30
GP-24A	GP-24-d-85
GP-24B	GP-24-s-20
GP-25A	GP-25-d-65
GP-25B	GP-25-s-30
GP-26A	GP-26-s-40
GP-26B	GP-26-s-10
GP-27	GP-27-d-60

BASE MAP SOURCE:
PARKER LANDFILL MAPLE RIDGE TRAILER PARK AND LANDFILL CONCENTRATION MAP
FAIRBANKS SCALE, INC., LYNDONVILLE, VERMONT
SANBORN, HEAD & ASSOCIATES, AUGUST 2003

FIGURE 5

MAXIMUM LANDFILL GAS CONCENTRATION MAP

PARKER LANDFILL
LYNDONVILLE, VERMONT

Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0530-10102

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

Figure 6

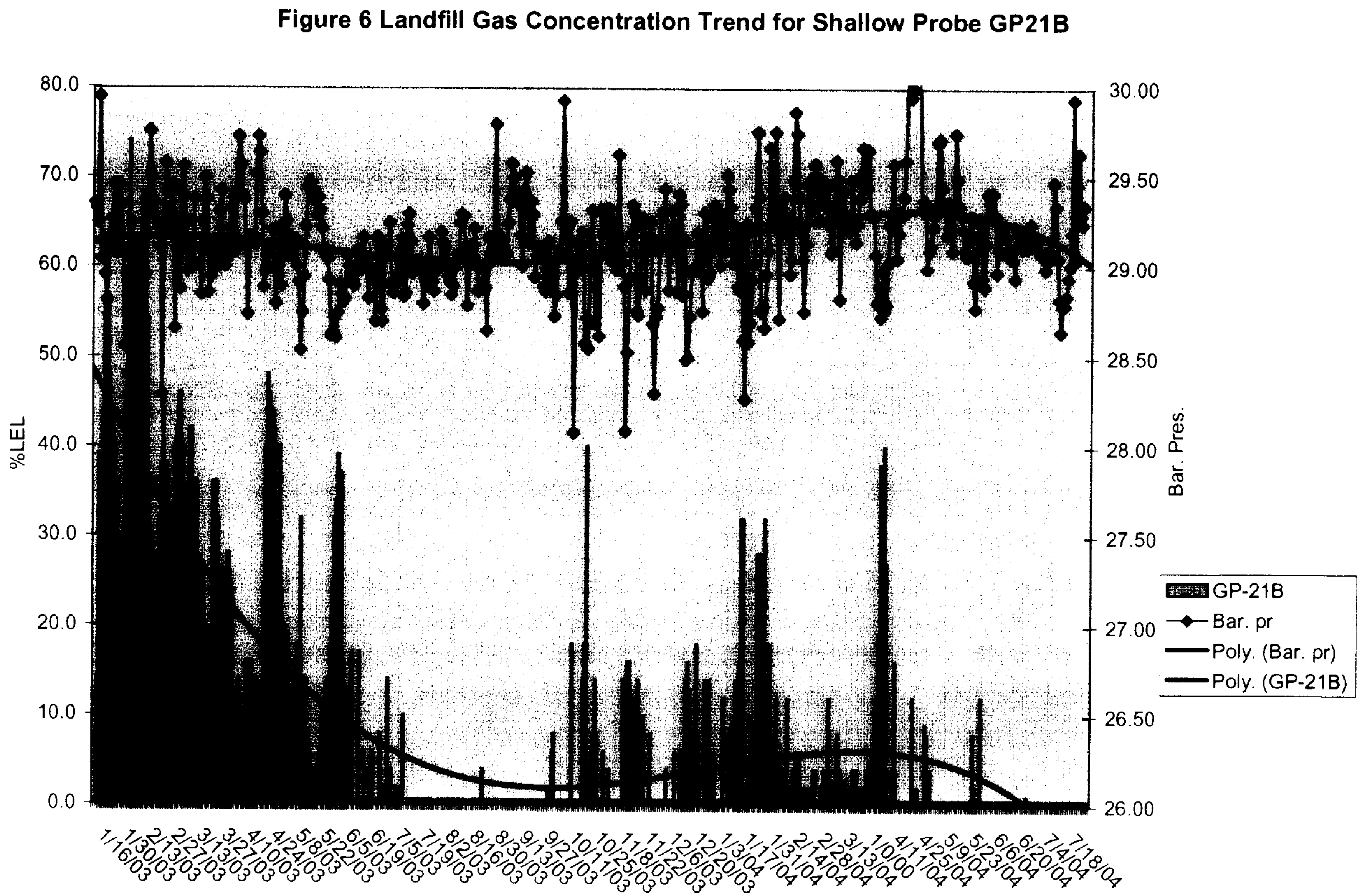
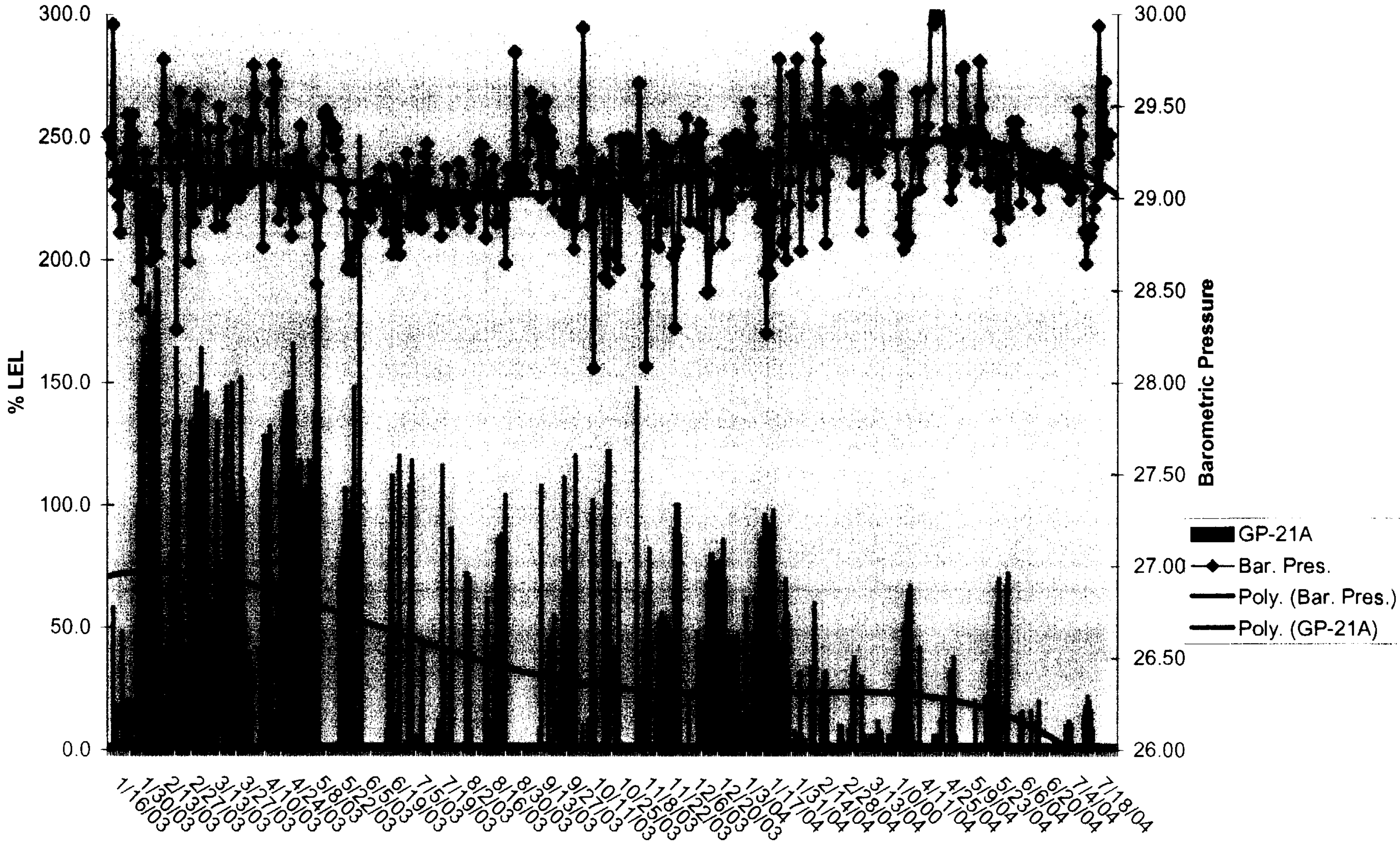


Figure 6 Landfill Gas Concentration Trend for Shallow Probe GP21B
%LEL
Bar. Pres.
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
30.00
29.50
29.00
28.50
28.00
27.50
27.00
26.50
26.00
GP-21B
Bar. pr
Poly. (Bar. pr)
Poly. (GP-21B)
1/16/03
1/30/03
2/13/03
2/27/03
3/13/03
3/27/03
4/10/03
4/24/03
5/8/03
5/22/03
6/5/03
6/19/03
7/5/03
7/19/03
8/2/03
8/16/03
8/30/03
9/13/03
9/27/03
10/11/03
10/25/03
11/8/03
11/22/03
12/6/03
12/20/03
1/3/04
1/17/04
1/31/04
2/14/04
2/28/04
3/13/04
1/0/00
4/11/04
4/25/04
5/9/04
5/23/04
6/6/04
6/20/04
7/4/04
7/18/04

Figure 7 Landfill Gas Concentration Trend for Deep Probe GP21A



ATTACHMENT 2

LIST OF DOCUMENTS REVIEWED

- Administrative Order by Consent for Remedial Investigation/Feasibility Study, prepared by EPA Region 1 and signed August 10, 1990.
- Declaration for the Record of Decision, prepared by EPA Region 1 and signed on April 4, 1995.
- Parker Landfill Unilateral Administrative Order for Remedial Design and Remedial Action, prepared by EPA Region 1 and signed on April 26, 1999. (includes Appendix A, Statement of Work for Remedial Design/Remedial Action, April 1999).
- Operation and Maintenance Plan, Landfill Gas Collection and Control System. Sanborn, Head & Associates, Inc., April 2004.
- Operations and Monitoring Report, 1st Quarter 2004. Sanborn, Head & Associates, Inc., April 30, 2004.
- 1,4-Dioxane Sampling Results. Letter prepared by URS and dated June 22, 2004.
- April 2004 Monitoring Report. URS, June 15, 2004.
- Draft 2003 Annual Long-Term Monitoring Report. URS, January 16, 2004.

ATTACHMENT 3

INTERVIEW DOCUMENTATION

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Various (see site inspection sign-in sheet)	Various	Various	May 19, 2004
John Schmeltzer	Project Manager	VTDEC	August 13, 2004
Jason Clere	Environmental Eng.	URS	August 13, 2004
Justin Smith	Zoning Dept.	Town of Lyndonville	August 23, 2004

INTERVIEW RECORD

Site Name: Parker Landfill		**EPA ID No.:**
Subject:	**Time:**	**Date:**
Type: ☐ Telephone ☑ Visit ☐ Other **Location of Visit:** Parker Landfill Site		☐ Incoming ☐ Outgoing

Contact Made By:

Name: Greg Mischel	**Title:** Project Manager	**Organization:** TRC

Individual Contacted:

Name: see Attached list	**Title:** —	**Organization:** —
Telephone No: see Attached List **Fax No:** **E-Mail Address:**	**Street Address:** **City, State, Zip:**	

Summary Of Conversation

Site interviews coordinated with site inspection to provide opportunity to comment and ask questions. The main concerns were related to the condition of the wetland replication and erosion located at the north east corner of L.F. below cap and at the sed. basin. The erosion was repaired the year before. The repairs were holding up well. The water level in the wetland replication looked low. Adding height to the overflow wier was suggested to raise the water level.

Page 1 of ____

Parker Landfill 5-Year Review
Landfill Inspection

Name	Company/ Agency	Address	& Phone No
John Schmeltzer	VTDEC	Waterbury VT	802-241-3334
Colby Mecham	VT DEC	"	802-241-4638
JASON CLERE	URS	PORTLAND ME	207-879-7686
PAUL KAMINSKI	ETHAN ALLEN	DANBURY, CT	203-743-8540
DAN FURLASTRO	GMI	PITTSBURGH PA	412-244-0917
David Adams	SHA	Essex Jct, VT	802-288-9119
Ed Hathaway	EPA	Boston, MA	617 [illegible]
Tom CLELAND	~~FAIRBANKS~~	BETHLEHEM, NH	603-869-3352
Jeff [illegible]	TRC	Lowell MA	978 656 3574

INTERVIEW RECORD

Site Name: Parker Landfill	**EPA ID No.:**	
Subject: Five Year Review	**Time:** 11:00 am	**Date:** August 13, 2004
Type: **Telephone X** Visit Other **Location of Visit:**	Incoming **Outgoing X**	

Contact Made By:

Name: Greg Mischel	**Title: Project Manager**	**Organization:** TRC Environmental

Individual Contacted:

Name: John Schmeltzer	**Title: Project manager**	**Organization: VTDEC**

Telephone No: 802-241-3886 **Fax No:** **E-Mail Address:**	**Street Address:** 103 South Main Street, West Building **City, State, Zip:** Waterbury, Vermont 05671-0404

Summary Of Conversation

Q1 What is your overall impression of the project?
A1 John was pleased with the condition of the cap and feels the cap is performing as intended. John is still concerned with the extent of gas under the mobile home park. The gas needs further delineation as required in the latest EPA letter regarding the subject.

Q2 Have there been any complaints, violations, or other incidents related to the site requiring a response by your office?
A2 The Riverside School contacted the State with a concern regarding the possible exposure of the students to the contamination from the site.

Q3 Are there any active community groups?
A3 No.

Q4 Do you feel well informed about the site's activities and progress?
A4 John is well informed about activities.

Q5 Is there anyone using the impacted groundwater near the site?
A5 Everyone is on public water whose well was impacted by the site.

Q6 What do you know about the recently constructed building and the planned development of the properties on the south side of Brown Farm Road?
A6 The properties are outside the proposed institutional control area boundary. The recently constructed building is a church. John does not have any information regarding the proposed development and suggested calling Scott Townsend of the Town of Lyndonville.

INTERVIEW RECORD

Site Name: Parker Landfill	**EPA ID No.:**	
Subject: Five Year Review	**Time:** 1:00 pm	**Date:** August 13, 2004
Type: **Telephone** X Visit Other **Location of Visit:**	Incoming **Outgoing X**	

Contact Made By:

Name: Greg Mischel	**Title:** Project Manager	**Organization:** TRC Environmental

Individual Contacted:

Name: Jason Clere	**Title:**	**Organization:** URS
Telephone No: 207-879-7686 **Fax No:** **E-Mail Address:**	**Street Address:** 115 Water Street **City, State, Zip:** Hallowell, ME 04347	

Summary Of Conversation

Q1 The currently proposed remedy is designed to treat chlorinated hydrocarbons, how does the remedy deal with the other COCs such as metals and SVOCs?
A1 Metals were not targeted for treatment because the data suggests there is no plume associated with the SWDA, the detections are sporadic and some of the metals were detected in the background wells, and the detections are located on site. SVOCs are not migrating off site and are not particularly mobile in the environment. The detections are limited to 3 wells within the footprint of the institutional control and groundwater reclassification boundary, therefore should be no exposure.

Q2 Cyanide and SVOCS were identified as COCs for sediment in the ROD but are not currently being monitored as part of the LTMP, why?
A2 The focus was on metals and VOCs in the LTMP. There was no indication that sediment required more work. Jason will investigate the reason for the current monitoring program and get back to me with an answer next week.
Jason indicated that the possibility of indoor air contamination from the groundwater plume was investigated after the Riverside School expressed concerns regarding the health of the students. URS used the Johnson & Ettinger model to evaluate the potential for exposure. They determined that exposure was unlikely due to the depth of the contamination and the layer of clean groundwater over the contamination. The results of the model were presented in a URS letter dated July 11, 2003. The EPA forwarded the results of the study to Kay Johnson at the Riverside School in a letter dated July 30, 2003.

Q3 Do you have any information regarding the new building and the planned development on the south side of Brown Farm Road?
A3 The new building is a church. Jason was not sure if the church had a private water well. The house further up the hill has a deep bedrock well but is well outside the IC boundary. The bedrock surface was about 200 feet below the surface. The new development will be connected to public water supply and will not use private wells. Jason said to contact Justin Smith of the Zoning Dept. or Scott Townsend (the Water Commissioner) for more information.

INTERVIEW RECORD

Site Name: Parker Landfill		**EPA ID No.:**
Subject: Five Year Review	**Time: 3:45 pm**	**Date: 8/23/04**
Type: **Telephone X** Visit Other **Location of Visit:**		Incoming **Outgoing X**

Contact Made By:

Name: Greg Mischel	**Title: Project Manager**	**Organization:** TRC Environmental

Individual Contacted:

Name: Justin Smith	**Title: Zoning Department**	**Organization:** Town of Lyndonville
Telephone No: 802-626-1269 **Fax No:** **E-Mail Address:**	**Street Address:** Zoning Department **City, State, Zip:** Lyndonville, Vermont	

Summary Of Conversation

Q1: Are you familiar with the site and the institutional controls (IC) being implemented to restrict use of groundwater?
A1: Yes, Justin thinks the area of IC was defined by the EPA, but the area was defined before he was part of the Zoning department. The Town has implemented a Zoning Ordinance that restricts groundwater usage in the area around the site.

Q2: What roads are included in the zoning ordinance?
A2: Development is allowed but the houses must be hooked up to the municipal water supply system. The roads include Lily Pond Road, Red Village Road, and Brown Farm Road.

Q3: The EPA is concerned with a proposed development on the south side of Brown Farm Road, will this development be required to hook up to the municipal water system?
A3: Yes, but they will have a community septic system.

Q4: Is the church on Brown Farm Road on Municipal water, or do they have a private well?
A4: The church is on municipal water supply.

ATTACHMENT 4

FIVE-YEAR REVIEW SITE INSPECTION

TRC

Customer-Focused Solutions

TRC Reference # 02136-0400-09096

August 16, 2004

Mr. Edward Hathaway
Remedial Project Manager
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Mailcode HBT
Boston, Massachusetts 02214-2023

Subject: Five Year Review Inspection Report, Spring 2004
Parker Landfill Superfund Site, Lyndonville, Vermont

Reference: Contract No. 68-W6-0042 (Subcontract 107061)
Work Assignment No. 131-TATA-01ZZ
Multi-Site Post Construction Monitoring

Dear Mr. Hathaway:

This letter report documents and presents the observations made by TRC Environmental Corporation (TRC) during the Five Year Review Inspection of Parker Landfill in Lyndonville, Vermont (Site) on May 19, 2004. The inspection team from TRC included an engineer and a wetland scientist. Other persons attending the inspection included representatives from the Environmental Protection Agency (EPA), Vermont Department of Environmental Conservation (VTDEC), representatives from the potentially responsible parties (PRPs) Fairbanks Scales, Inc. and Ethan Allen, Inc., and consultants for the PRPs. A copy of the inspection sign-in sheet is attached to the site-specific inspection checklist and site plan that was used to document the inspection (Attachment 1).

This Report is based on visual observations made during the inspection with reference to the Record Drawings of the cover system installation. The inspection by TRC consisted of the following scope of work:

- The TRC engineer walked the perimeter and top of the Solid Waste Disposal Area (SWDA) landfill cap and Industrial Waste Area 3 (IWS-3) cap to look for evidence of erosion, cap disturbance, excessive settlement, and poor growth of vegetation.
- On and off-cap storm water control structures were inspected for damage, settlement, sedimentation, vegetation and blockage.
- The above ground portions of structures that penetrate the cap (i.e. gas vents and utility poles) were inspected for damage. No attempt was made to evaluate subsurface conditions.

- The landfill gas flare was inspected for apparent damage and to confirm that the flare was operating at the time of the inspection. No testing was performed to determine if the flare components were operating within specified ranges, or to measure the contaminant removal efficiency of the flare.
- The above ground portions of the automated landfill gas monitoring system installed at the perimeter of the landfill adjacent to the mobile home park were inspected for damage.
- The TRC wetland scientist inspected the wetland mitigation area.

Observations made during the inspection are summarized below.

SUMMARY OF INSPECTION

The results of the inspection are presented for each component of the landfill cover system. The following sections of the report correspond to the inspection items listed in the checklist.

Landfill Surface

The surface of the SWDA landfill cap and the IWS-3 cap were in good condition with no signs of erosion, holes, cracks or bulging. The cover systems appeared to be firm and stable on the day of the inspection. The vegetative cover was in good condition (Photos 1, 2 and 3).

An apparent animal burrow and associated erosion rill were observed on the steep embankment below and to the north of the IWS-3 cap (Photo 4). The animal should be removed and the hole and erosion repaired in order to prevent possible undermining of the IWS-3 cap.

An area of erosion located just below the edge of the cap at the northeastern corner of the SWDA landfill was observed during the Spring and Fall 2002 inspections. Rip rap had been placed over the area in order to stabilize the erosion in 2003. This area was checked for indications of recent erosion. The rip rap appeared to be stable and no further erosion was observed (Photo 5).

Benches

The benches were in good condition with no signs of erosion, undermining or bypass.

Downcomers

The two gabion-lined downcomers, or letdown channels, were inspected for settlement, material degradation, erosion, undercutting, obstructions and vegetative growth. Downcomer #1 was in good condition at the time of the inspection (Photos 6).

Downcomer #2 was in good condition with the exception of an area of what appeared to be settlement of the gabions in the bottom of the channel between the first and second slope benches from the perimeter ditch (Photo 7). The bottom gabions appeared to have settled approximately six inches when compared to surrounding gabions (Photo 8). The cause of the settlement was not apparent at the time of the inspection. TRC recommends close monitoring of the settlement over the next year so that repairs can be made in a timely manner if the functionality of the downcomer is impaired, or the integrity of the cap is threatened. Particular attention should be given to evidence of erosion or undercutting beneath the gabions. If left uncorrected, significant erosion could expose or damage the drainage layer and geomembrane liner of the cap system.

Cover Penetrations

Cover penetrations through the SWDA landfill cover system include 17 active gas extraction wells (Photo 9) and one inactive gas well, and eight concrete vault structures that allow present and future utility poles to pass through the cover system. Four of the concrete vaults contain utility poles and four others are reserved for the possible installation of utility poles in the future.

The gas extraction wellheads were previously covered by 36" diameter, high-density polyethylene (HDPE) enclosures. The HDPE enclosures had been removed and placed in a pile near the landfill entrance gate. At the time of the inspection, the lids of the enclosures were removed to reveal the wellhead structures that allow monitoring of pressure and landfill gas composition as well as temperature and gas flow rate. According to representatives of Fairbanks Scales, ice that builds up in the piping at the wellheads is routinely removed in order to maintain proper gas flow. In addition, Fairbanks indicated that any restriction caused by the ice buildup did not affect the performance of the gas management system. TRC recommends that the PRPs continue to monitor the performance of the system and implement corrective actions to prevent ice buildup and gas flow restriction if the gas extraction performance is affected. The previously observed (Fall 2003 inspection) crack in the plastic flange of EW-16 had been repaired.

Perimeter Gas Probes/Gas Monitoring System

The shed constructed to house the gas sensor data logger and alarm system components was inspected and found in good condition (Photo 10). According to representatives of Fairbanks Scales, the gas monitoring system does not operate properly and has not been used for subsurface gas monitoring. The electronic signal transmitted from the gas sensors in the gas probes to the data-logging/alarm system in the shed has been observed by Fairbanks in the past to fluctuate erratically and has not been consistent with measurements of gas concentrations using hand-held instruments. The cause of the malfunction is unknown. The landfill gas monitoring and data logging system remains inactive due to concerns regarding the accuracy of the system. The PRP is currently hand monitoring the gas probes with the concurrence of the EPA instead of relying on the automated monitoring system.

Cover Drainage Layer

Water seeping into the cover drainage layer is either collected in drainage pipes beneath the slope benches and perimeter ditches, or is allowed to weep out of a layer of crushed stone placed at the edge of the cover system. The drainage pipes daylight at the downcomers or in the riprap-lined portions of the perimeter ditch. No obstructions were observed at the ends of the drainage pipes. The crushed stone layer along the edge of the cover system appeared to be in place and did not appear to be clogged (Photo 11).

Sedimentation Basin

The sedimentation basin is in good condition and appears to be functioning properly. Two rip rap-lined drainage structures (downcomers) located on the southern and western sidewall of the sedimentation basin (Photos 12, 13, and 14) had been damaged in 2002 by undercutting erosion. Both downcomers were repaired. No further erosion was observed.

Perimeter Ditches and Off-Site Discharge

The perimeter ditches were in good condition with no signs of erosion, sedimentation, or blockage (Photo 15).

Perimeter and Access Roads

The perimeter and access roads of the SWDA were in good condition (Photo 16). Erosion was observed in the access road leading from the SWDA to the IWS-3 cap (Photo 17). The erosion should be repaired to maintain access to the IWS-3 area for maintenance.

Landfill Gas Flare

The landfill gas flare was operating at the time of the inspection. No apparent damage or changed condition was observed (Photo 18).

Compensatory Wetland

The compensatory wetland was inspected by a TRC wetland scientist to assess the success of the mitigation (Photo 19). The wetland compensation area appears to be functioning as designed and includes patches of open water in addition to palustrine emergent plant communities. The TRC wetland scientist and representatives of the VTDEC suggested that the water depths be increased within the wetland compensation area by elevating the weir structure. The increase in water depths is intended to encourage habitat usage by a broader range of aquatic organisms and the development of aquatic plants within open water habitat.

Recommendations

The following corrective actions are recommended at this time:

- Fill in the burrow hole and repair the erosion on the steep embankment below the IWS-3 cap;
- Repair the erosion and take steps to prevent further erosion of the access road leading from the SWDA to IWS-3.
- Monitor the settlement of Downcomer No. 2 and investigate/repair if the functionality of the downcomer or the integrity of the cap is threatened;
- Monitor the gas extraction wells and institute measures to prevent the gas extraction wellheads from freezing if the performance of the landfill gas system is impaired.
- Raise the weir structure of the Wetland Compensation area to increase the water level to encourage additional habitat usage.

Please do not hesitate to contact Greg Mischel at (978) 656-3569 with any questions or comments.

Sincerely,

TRC Environmental Corporation

Greg A. Mischel

Gregory A. Mischel, P.E.
Project Manager

Cc: Neil Thurber, M&E
Tom Cleland, Fairbanks Scales

Attachments:

Attachment 1, Inspection Checklist and Site Plan
Attachment 2, Inspection Photographs

Attachment 1

Inspection Checklist and Site Plan
May 19, 2004

Semi-Annual Inspection Report
Parker Landfill Superfund Site

TRC

Customer Focused Solutions

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: Parker Landfill	**Date of inspection:** 5/19/04
Location and Region: Lyndonville, VT	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** clear

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☑ Access controls some
- ☑ Institutional controls
- ☐ Groundwater pump and treatment
- ☑ Surface water collection and treatment
- ☐ Other________
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☑ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** * ________ Name ________ Title ________ Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ________
   Problems, suggestions; ☐ Report attached ________

2. **O&M staff** ________ Name ________ Title ________ Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ________
   Problems, suggestions; ☐ Report attached ________

* Representative of EPA, VTDEC and the PRPs were on site during the inspection. See attached sign-in sheet.

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency VTDEC
Contact John Schweltzer Project Manager 5/19/04 ______
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply) *

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ Other permits ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks Quarterly reports are submitted.

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☑ N/A

   Remarks GW monitoring is not required for the Cap remedy.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ☑ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ☑ N/A

   Remarks

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☑ N/A

    Remarks

* A secure building is not available at the site to store documents. All documents are located at the Fairbank Scales office in St. Johnsbury.

IV. O&M COSTS

1. **O&M Organization**
   - ☐ State in-house
   - ☑ PRP in-house
   - ☐ Federal Facility in-house
   - ☐ Other____________________
   - ☐ Contractor for State
   - ☑ Contractor for PRP
   - ☐ Contractor for Federal Facility

2. **O&M Cost Records** N A
   - ☐ Readily available
   - ☐ Up to date
   - ☐ Funding mechanism/agreement in place

   Original O&M cost estimate__________________ ☐ Breakdown attached

   Total annual cost by year for review period if available

From (Date)	To (Date)	Total cost	
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: ____________________

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☑ Gates secured ☐ N/A
   Remarks No damage observed.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☑ N/A
   Remarks____________________

C. Institutional Controls (ICs)

1. **Implementation and enforcement** ICs not yet in place.

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) ______
Frequency ______
Responsible party/agency ______
Contact ______ ______ ______ ______
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☐ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks______

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident
Remarks______

2. **Land use changes on site** ☐ N/A
Remarks None

3. **Land use changes off site** ☐ N/A
Remarks None

VI. GENERAL SITE CONDITIONS

A. Roads ☑ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☑ Roads adequate ☐ N/A
Remarks______

B. Other Site Conditions

Remarks____

VII. LANDFILL COVERS ☑ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement (Low spots)** ☐ Location shown on site map ☐ Settlement not evident
Areal extent__________ Depth__________
Remarks See letdown channel

2. **Cracks** ☐ Location shown on site map ☑ Cracking not evident
Lengths__________ Widths__________ Depths__________
Remarks____

3. **Erosion** ☐ Location shown on site map ☑ Erosion not evident
Areal extent__________ Depth__________
Remarks____

4. **Holes** ☐ Location shown on site map ☑ Holes not evident
Areal extent__________ Depth__________
Remarks____

5. **Vegetative Cover** ☑ Grass ☑ Cover properly established ☑ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks____

6. **Alternative Cover (armored rock, concrete, etc.)** ☑ N/A
Remarks____

7. **Bulges** ☐ Location shown on site map ☑ Bulges not evident
Areal extent__________ Height__________
Remarks____

8. **Wet Areas/Water Damage** ☑ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent______
☐ Ponding ☐ Location shown on site map Areal extent______
☐ Seeps ☐ Location shown on site map Areal extent______
☐ Soft subgrade ☐ Location shown on site map Areal extent______
Remarks______

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☑ No evidence of slope instability
Areal extent______
Remarks______

B. Benches ☑ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☑ N/A or okay
Remarks______

2. **Bench Breached** ☐ Location shown on site map ☑ N/A or okay
Remarks______

3. **Bench Overtopped** ☐ Location shown on site map ☑ N/A or okay
Remarks______

C. Letdown Channels ☑ Applicable ☐ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☑ Location shown on site map ☐ No evidence of settlement
Areal extent ~ 10 – 20' Depth ~ 6"
Remarks______

2. **Material Degradation** ☐ Location shown on site map ☑ No evidence of degradation
Material type______ Areal extent______
Remarks______

3. **Erosion** ☐ Location shown on site map ☑ No evidence of erosion
Areal extent______ Depth______
Remarks______

4. **Undercutting** ☐ Location shown on site map ☑ No evidence of undercutting
Areal extent______________ Depth______________
Remarks Settlement may be due to erosion under gabion mats.

5. **Obstructions** Type______________ ☑ No obstructions
☐ Location shown on site map Areal extent______________
Size______________
Remarks______________

6. **Excessive Vegetative Growth** Type______________
☑ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent______________
Remarks______________

D. Cover Penetrations ☑ Applicable ☐ N/A

1. **Gas Vents** ☑ Active ☐ Passive
☐ Properly secured/locked ☑ Functioning ☑ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks______________

2. **Gas Monitoring Probes** (off cap probes only)
☑ Properly secured/locked ☑ Functioning ☑ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks______________

3. **Monitoring Wells** (within surface area of landfill)
☑ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks______________

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☑ N/A
Remarks______________

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☑ N/A
Remarks______________

well B112B, no lock.

E. Gas Collection and Treatment	☑ Applicable	☐ N/A
1. **Gas Treatment Facilities** ☑ Flaring ☐ Thermal destruction ☐ Collection for reuse ☑ Good condition ☐ Needs Maintenance Remarks		
2. **Gas Collection Wells, Manifolds and Piping** ☑ Good condition ☐ Needs Maintenance Remarks		
3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks Subsurface gas detectors and data logging system do not appear to be functioning properly		
F. Cover Drainage Layer	☑ Applicable	☐ N/A
1. **Outlet Pipes Inspected** Remarks	☑ Functioning	☐ N/A
2. **Outlet Rock Inspected** Remarks	☑ Functioning	☐ N/A
G. Detention/Sedimentation Ponds	☑ Applicable	☐ N/A
1. **Siltation** Areal extent______ Depth______ ☐ Siltation not evident Remarks		☑ N/A
2. **Erosion** Areal extent______ Depth______ ☑ Erosion not evident Remarks		
3. **Outlet Works** Remarks	☑ Functioning	☐ N/A
4. **Dam** Remarks	☑ Functioning	☐ N/A

H. Retaining Walls ☐ Applicable ☑ N/A
1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement________ Vertical displacement________ Rotational displacement________ Remarks________
2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks________
I. Perimeter Ditches/Off-Site Discharge ☑ Applicable ☐ N/A
1. **Siltation** ☐ Location shown on site map ☑ Siltation not evident Areal extent________ Depth________ Remarks________
2. **Vegetative Growth** ☐ Location shown on site map ☑ N/A ☐ Vegetation does not impede flow Areal extent________ Type________ Remarks________
3. **Erosion** ☐ Location shown on site map ☑ Erosion not evident Areal extent________ Depth________ Remarks________
4. **Discharge Structure** ☑ Functioning ☐ N/A Remarks________
VIII. VERTICAL BARRIER WALLS ☐ Applicable ☑ N/A
1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent________ Depth________ Remarks________
2. **Performance Monitoring** Type of monitoring________ ☐ Performance not monitored Frequency________ ☐ Evidence of breaching Head differential________ Remarks________

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☑ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☑ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☑ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks____

C. Treatment System ☐ Applicable ☑ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters_______________
☐ Additive (*e.g.*, chelation agent, flocculent)_______________
☐ Others_______________
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually_______________
☐ Quantity of surface water treated annually_______________
Remarks_______________

2. **Electrical Enclosures and Panels** (properly rated and functional)
☑ N/A ☐ Good condition ☐ Needs Maintenance
Remarks_______________

3. **Tanks, Vaults, Storage Vessels**
☑ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks_______________

4. **Discharge Structure and Appurtenances**
☑ N/A ☐ Good condition ☐ Needs Maintenance
Remarks_______________

5. **Treatment Building(s)**
☑ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks_______________

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_______________

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☑ N/A
Remarks____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

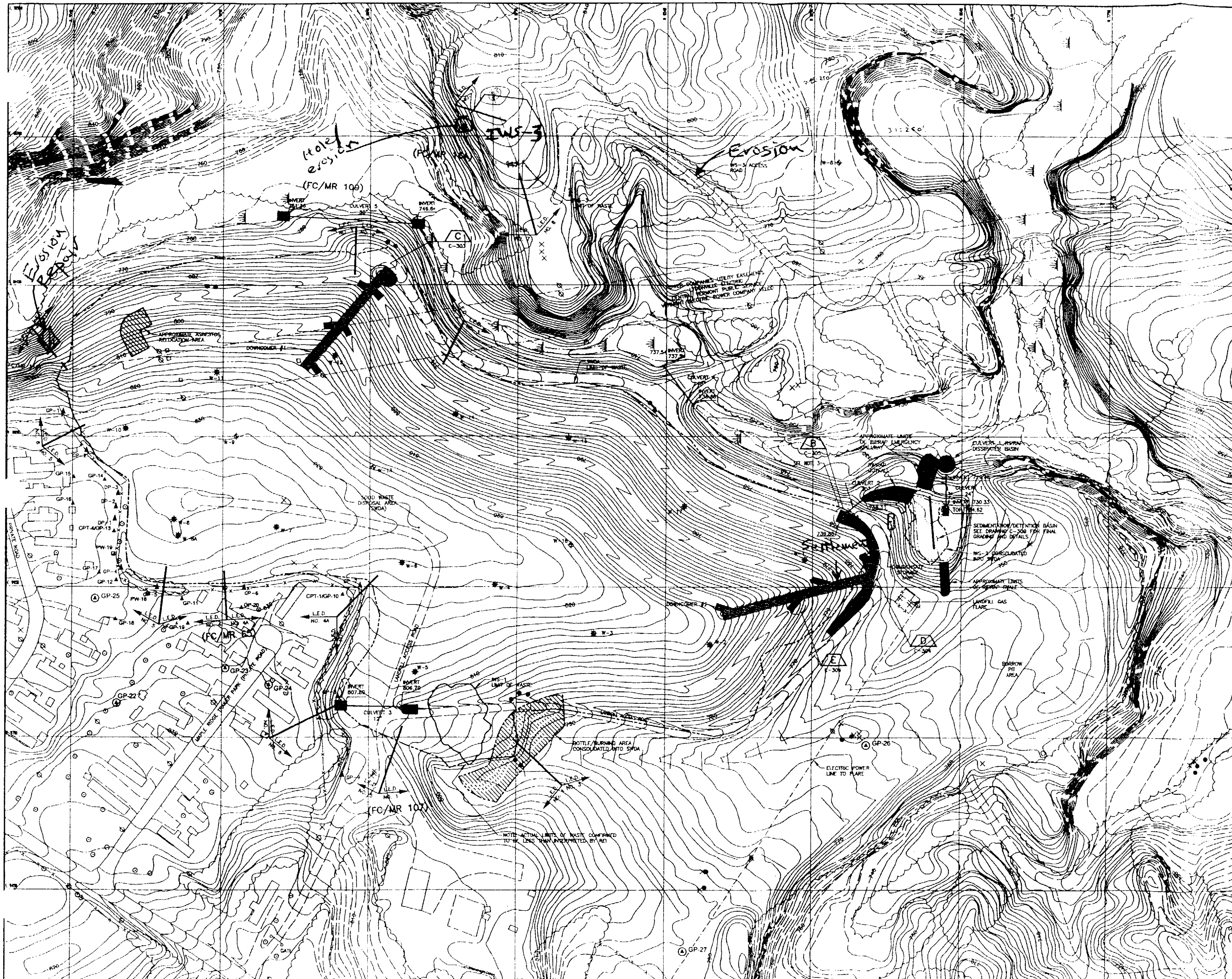
The landfill cap is in good condition. The PRP should monitor settlement in letdown channel and investigate if continues to worsen. Erosion repairs in sed. basin appear to have been adequate.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Overall O&M is good.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. None
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Gas management system is continually optimized as part of regular O&M.



Nº	Revision	Date	Initial

LEGEND

- ▲ GP-12 EXISTING GAS PROBE LOCATION
- ◻ PW-19 PILOT EXTRACTION WELL LOCATION
- ● EXISTING MONITORING WELL
- Ⓐ GP-25 APPROXIMATE LOCATIONS OF GAS PROBES

TRC Inspection
5/19/04

NOTE:
LOCATIONS OF GAS PROBES GP-10 THROUGH GP-20 AND PW-19 AND PW-19 WERE ADDED TO HARDING'S AS-RECORDED DRAWING C-91.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY

Approved

DRAWING STATUS

Status	Date	Initial

PARKER LANDFILL SUPERFUND SITE
Lyndonville, Vermont

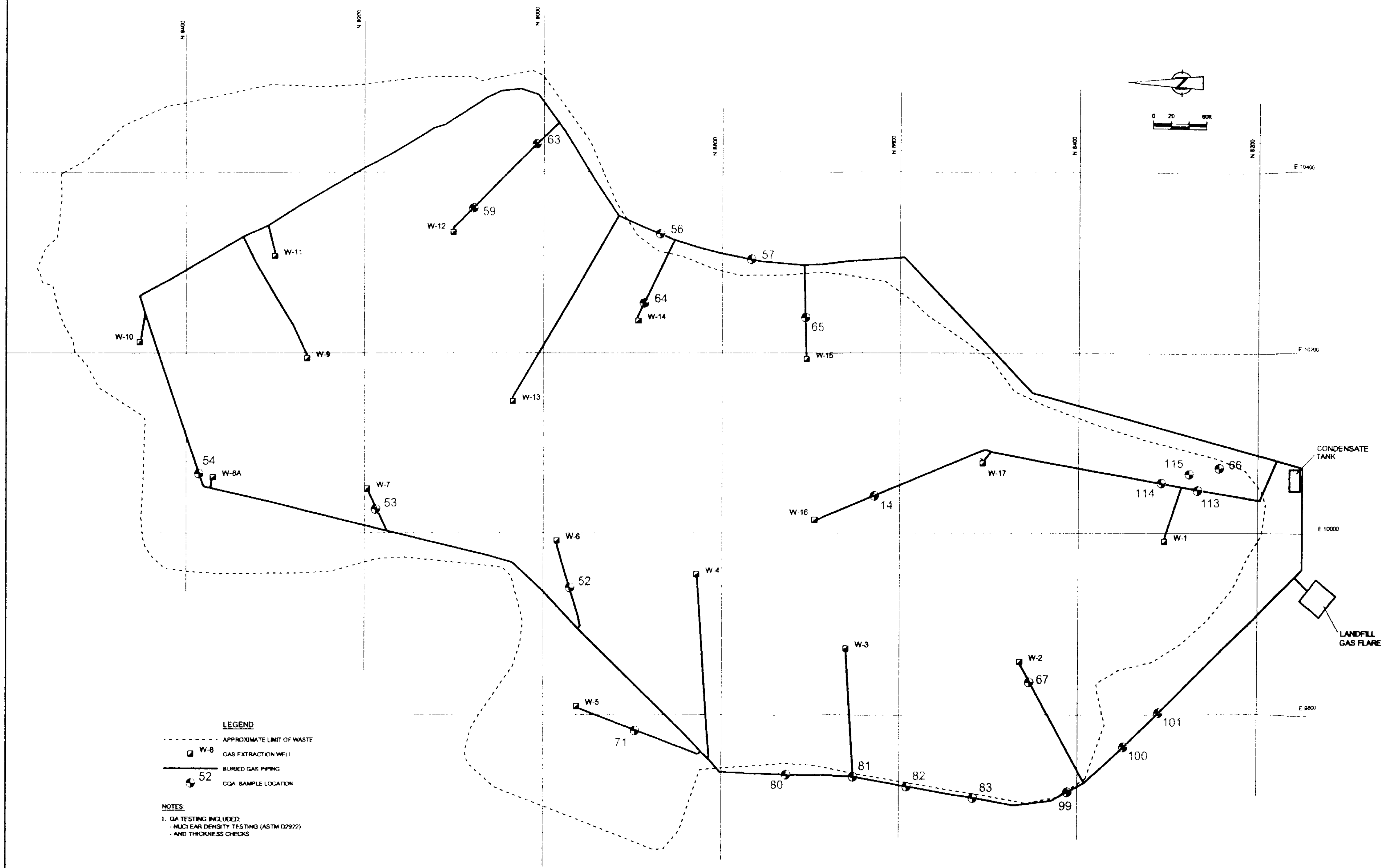
FINAL CONDITIONS PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: DRAWING C-91 RA REPORT (HARDING, FEBRUARY 2001)

Project Manager:	Reviewed By:	Date:	
F. TAYLOR	R. KOSTYK	JUNE 25, 2001	
Scale: 1"=80'	Project Nº: 14199-42	Report Nº: 005	Drawing Nº: C-91

14199-42(005)GN-WA006 JUL 05/2001



Nº	Revision	Date	Initial

LEGEND

- - - - APPROXIMATE LIMIT OF WASTE
W-8 GAS EXTRACTION WELL
—— BURIED GAS PIPING
52 CQA SAMPLE LOCATION

NOTES:

1. QA TESTING INCLUDED:
   - NUCLEAR DENSITY TESTING (ASTM D2922)
   - AND THICKNESS CHECKS

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

ETHAN ALLEN, INC.
Lyndonville, Vermont

PARKER LANDFILL SUPERFUND SITE

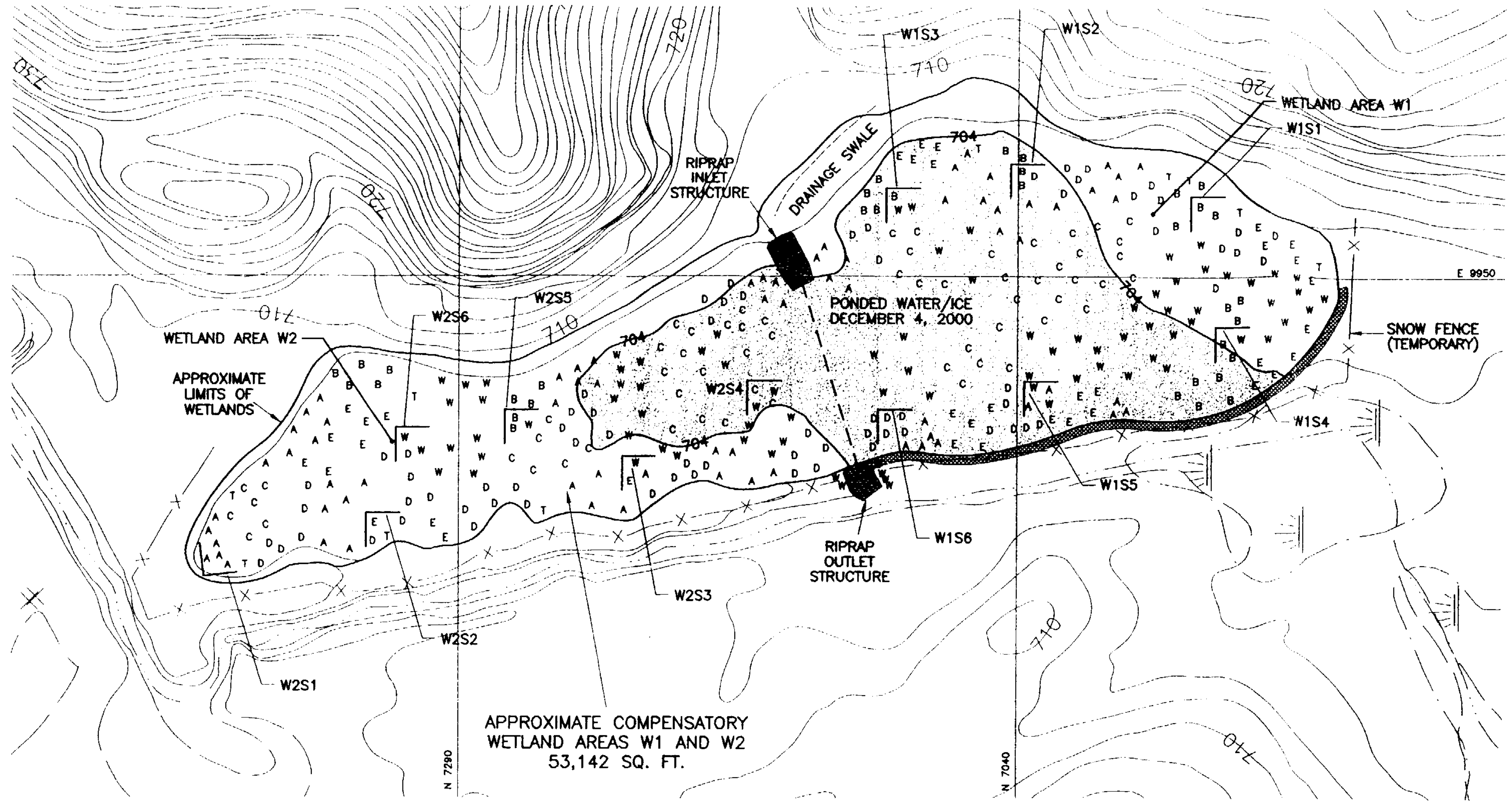
CQA SOIL TEST LOCATIONS
(LFG SYSTEM TRENCHES)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: DRAWING C-107 RA REPORT (HARDING, FEBRUARY 2001)

Project Manager:	Reviewed By:	Date:	
F. TAYLOR	J. RICE	JUNE 25, 2001	
Scale: AS SHOWN NA	Project Nº: 14199-42	Report Nº: 005	Drawing Nº: C-107

14199-42(005)GN-WA002 JUL 05/2001



PLANTING SCHEDULE

QUANTITY				DESCRIPTION	SIZE	CONDITION
SYMBOL	W1	W2	TOTAL			
A	30	40	70	SPECKLED ALDER (Alnus rugosa)	1 m tall	ball & burlap
B	25	10	35	HIGHBUSH BLUEBERRY (Vaccinium corymbosum)	1 m tall	ball & burlap
D	30	40	70	RED-OSIER DOGWOOD (Cornus stolonifera)	1 m tall	ball & burlap
E	25	10	35	ELDERBERRY (Sambucus canadensis)	1 m tall	ball & burlap
W	49	37	80	BLACK WILLOW (Salix nigra)	1 m tall	ball & burlap
C	30	30	60	BUTTONBUSH (Cephalanthus occidentalis)	1 m tall	ball & burlap
T	5	5	10	TAMARACK (Larix laricina)	1 m tall	ball & burlap

PLOT DESCRIPTIONS

PLOT #	DESCRIPTION
W1S1	2 HIGHBUSH BLUEBERRY
W1S2	1 RED OSIER DOGWOOD, 2 HIGHBUSH BLUEBERRY
W1S3	1 HIGHBUSH BLUEBERRY, 2 WILLOW
W1S4	2 HIGHBUSH BLUEBERRY, 1 WILLOW
W1S5	2 WILLOW, 2 ALDER
W1S6	4 RED OSIER DOGWOOD
W2S1	3 ALDER (Note: stake is at northwest corner of plot)
W2S2	1 ELDERBERRY, 2 RED OSIER DOGWOOD
W2S3	1 ALDER, 1 ELDERBERRY, 1 WILLOW
W2S4	2 BUTTONBUSH, 2 WILLOW
W2S5	2 HIGHBUSH BLUEBERRY, 1 WILLOW
W2S6	1 RED OSIER DOGWOOD, 2 WILLOW

NOTES:

1. W1S1 TO W1S6 = 6 MONITORING PLOTS FOR WETLAND AREA W1.
2. W2S1 TO W2S6 = 6 MONITORING PLOTS FOR WETLAND AREA W2.
3. STAKES MARK THE NORTHEAST CORNER OF EACH PLOT. (EXCEPT W2S1; NORTHWEST CORNER)
4. PLANTING LOCATIONS ARE APPROXIMATE.

SURVEY REFERENCE:
Compiled by James W. Sewall Company, Old Town, Maine by photogrammetric methods from aerial photographs dated December 4, 2000.

This map meets National Map Accuracy Standards for 1"-50' maps with 2' contours. Standard procedure dictates that photogrammetric maps be field-checked prior to use. In areas which are obscured by vegetation or physical features, contours and detail may only be approximate.
Dashed contours represent obscure areas.

0 15 30 60 FEET

NO.	DATE	REVISIONS	BY	CHK
0	2/27/01	RECORD DRAWINGS	DEL	SHM

DRAWN: DEL	PROJECT NO: 2481-04
ENGINEER: M PETERS	SCALE: 1"=30'
CHECKED:	APPROVED: SGS
DATE: 2/27/01	DATE: 2/27/01

Harding ESE
A MACTEC COMPANY
511 Congress Street
P.O. Box 7050
Portland, ME 04112-7050
(207) 775-5401

STATE OF VERMONT MARK A. PETERS PROFESSIONAL ENGINEER

ETHAN ALLEN
PARKER LANDFILL SUPERFUND SITE
LYNDONVILLE, VERMONT

CIVIL
COMPENSATORY WETLAND CREATION
WETLAND AREAS W1 AND W2

DRAWING NO: C-316

25 / 30

P:\CAD\Delta2\2481-01\record\C2481306.dwg Thu, 22 Feb 2001 - 6:37pm

Attachment 2

Inspection Photographs
May 19, 2004

Semi-Annual Inspection Report
Parker Landfill Superfund Site

TRC

Photo 1 East Slope of Landfill Looking South.

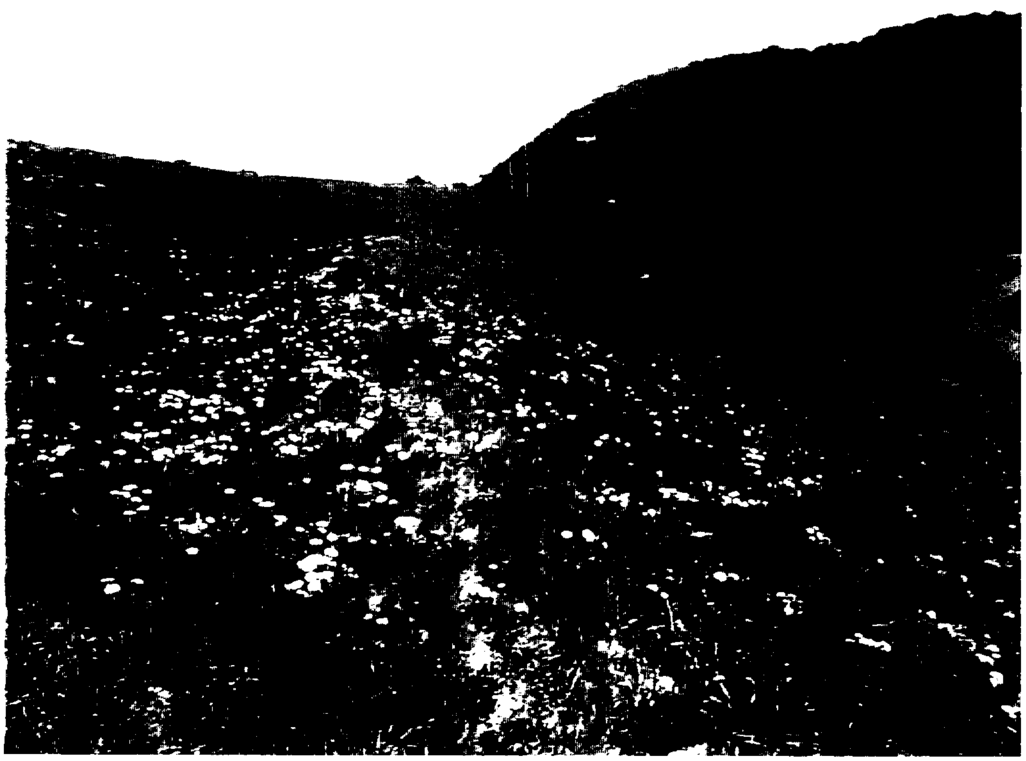


Photo 2 East Slope of Landfill Looking North.

Originals in color.

Photo 3 West Side of Landfill looking South

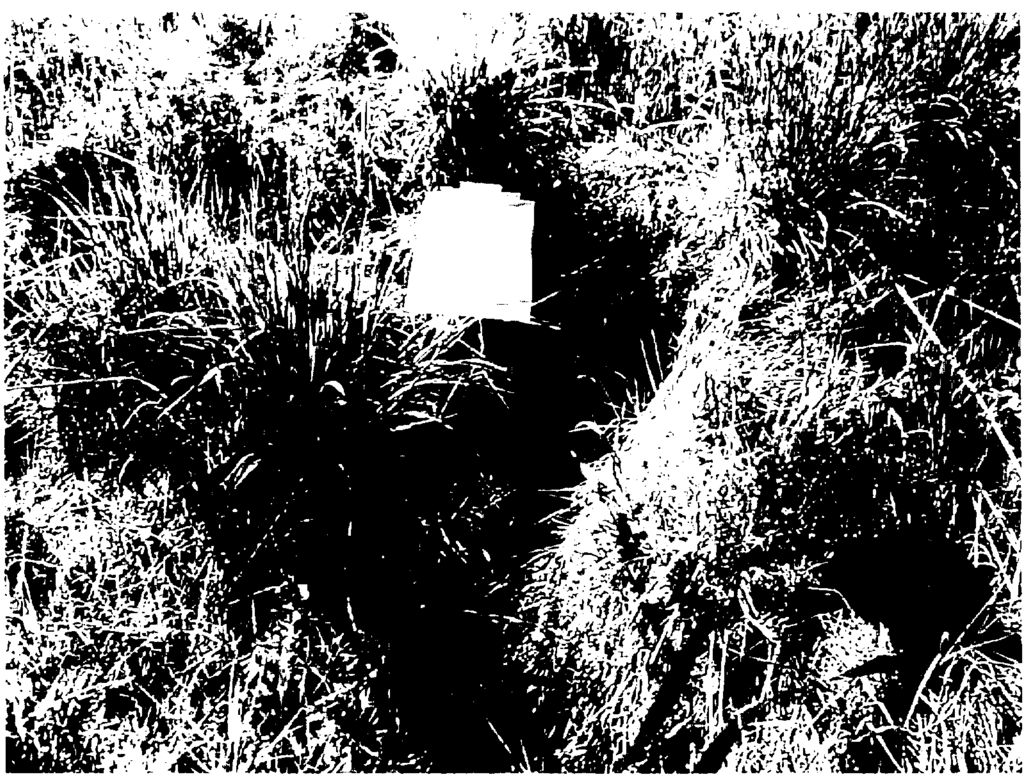


Photo 4 Hole and Erosion Below IWS-3 Cap

Photo 5 Rip Rap Repair of Erosion at Northeast Corner of Landfill.

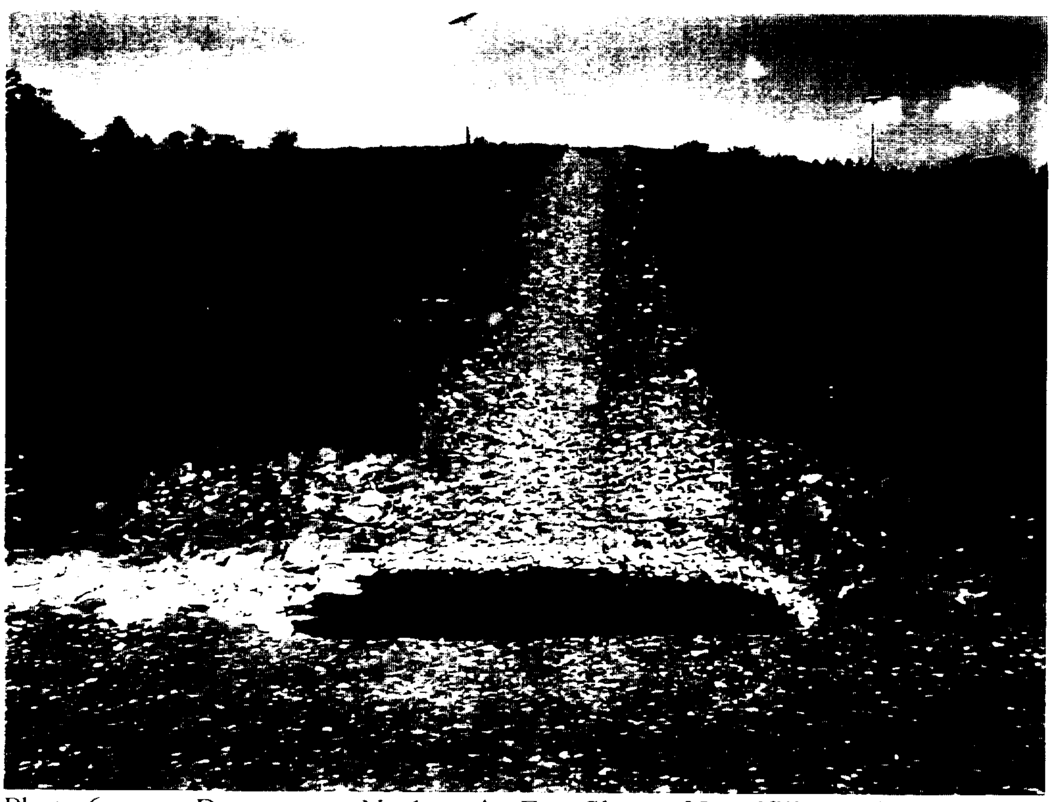


Photo 6 Downcomer No.1 on the East Slope of Landfill Looking West.

Originals in color.

Photo 7 Downcomer No.2 Looking North.

Photo 8 Settlement in Downcomer No. 2

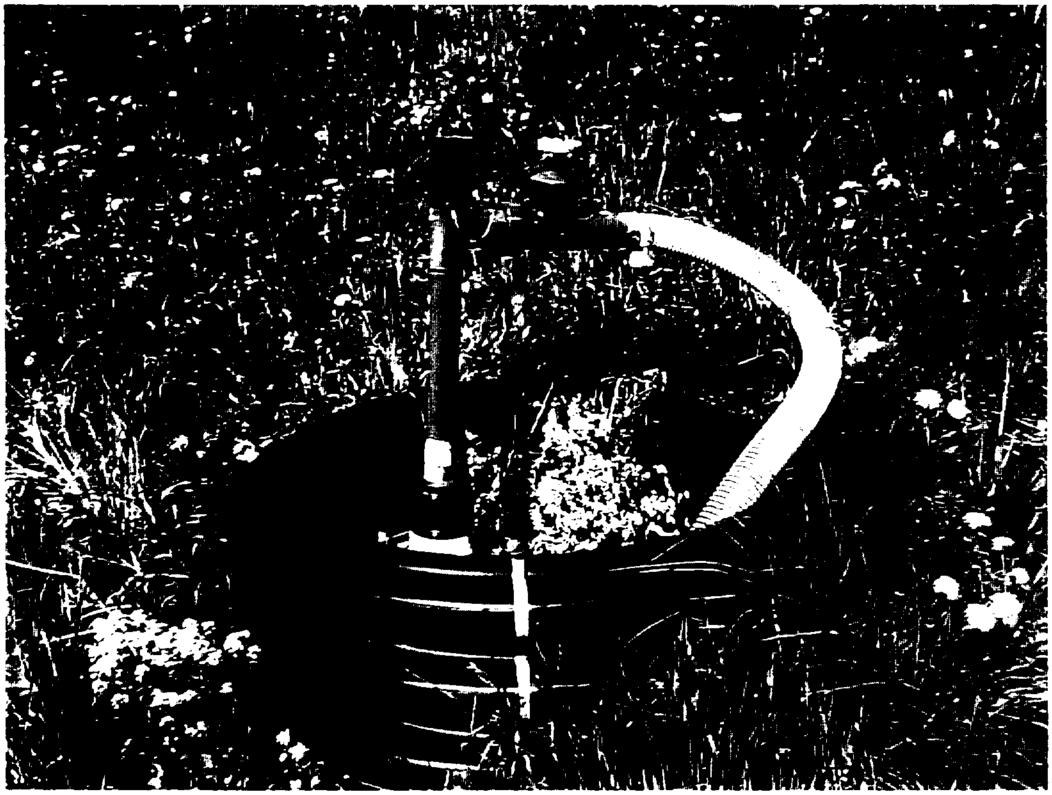


Photo 9 Typical Gas Extraction Well (EW-1).

Photo 10 Gas Monitoring System Shed.

Originals in color.

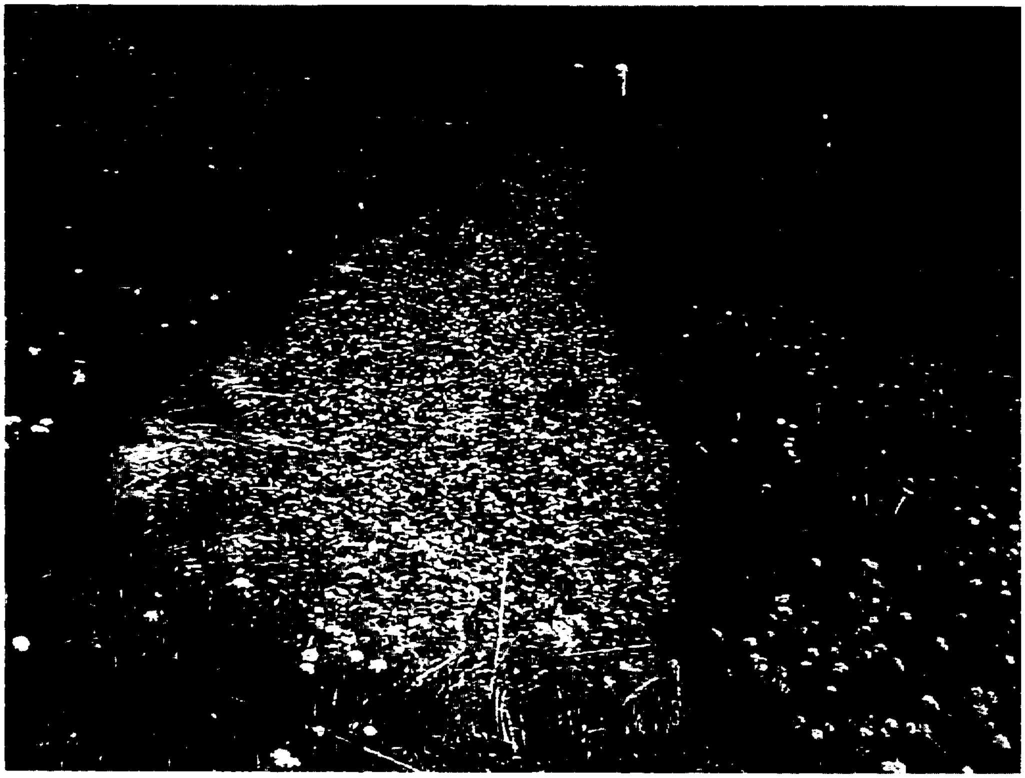


Photo 11 Crushed Stone Drainage Layer Outlet at Toe of Landfill.

Photo 12 Rip Rap Downcomer – West Sidewall of Sedimentation Basin.

Photo 13 Rip Rap Downcomer – South Sidewall of Sedimentation Basin.

Photo 14 Top of Rip Rap Downcomer – South Sidewall of Sedimentation Basin.

Originals in color

Photo 15 Outlet of Culvert No. 3.

Photo 16 Access Road at Top of Landfill.

Photo 17 Erosion in Access Road to IWS-3.

Photo 18 Landfill Gas Flare

Originals in color.

Photo 19 Wetland Compensation Area and Weir

ATTACHMENT 5

UPDATED TOXICITY DATA AND RISK CALCULATIONS

Table 1
Current Toxicity Criteria for Carcinogens

Constituent	Wt of Evidence Classification	Old Oral Slope Factor (mg/kg-d)-1	New Oral Slope Factor (mg/kg-d)-1	Date Changed
Acetone	D (a)			
Benzene	A (a)	2.9E-02 (a)	5.5E-02 (b)	1/19/2000
Butanone, 2-	D (a)			
Chloroform	B2 (a)	6.1E-03 (a)	1.0E-02 (b)	10/19/2001
Chloroethane	B2 [c]	2.9E-02 [c]	2.9e-3 [d]	4/2/2002
Dichlorodifluoromethane	- - (a)			
Dichloroethane, 1,1-	C (a)			
Dichloroethene, 1,1-	C (a)	6E-01 (a)	None (b)	8/13/2002
Dichloroethene, 1,2- (total)	- -			
Dichloropropane, 1,2-	B2 (e)	6.8E-02 (e)	Same (f)	
Dioxane, 1, 4-			1.1E-02 (b)	9/1/1990
Ethyl Benzene	D (a)			
Methylene Chloride	B2 (a)	7.05E-03 (a)	Same (b)	
Methyl-2-Pentanone, 4- (MIBK)	--			
Tetrachloroethene	B2-C [c]	5.2E-02 [c]	5.4E-02 (g)	
Toluene	D (a)			
Trichloroethane, 1,1,1-	D (a)			
Trichloroethene	B2-C [c]	1.1E-02 [c]	4E-01 [d]	8/1/2001
Vinyl Chloride	A ~~(b)~~ (a)	1.9E+00 [c]	7.2E-1 adult (b)	8/7/2000
Vinyl Chloride (cont'd)			1.4E+00 from birth (b)	8/7/2000
Xylenes, Total	D (a)			
Bis (2-ethylhexyl) Phthalate	B2 (a)	1.4E-02 (a)	Same (b)	
Dibenzofuran	D (a)			
Diethyl phthalate	D (a)			
Di-n-butylphthalate	D (a)			
Fluoranthene	D (a)			
Fluorene	D (a)			
Methylnaphthalene, 2-	~~--~~ D (a)			
Methylphenol, 4- (p-cresol)	C (a)			
Naphthalene	~~D~~ C (a)			
Phenanthrene	D (a)			
Pyrene	D (a)			
Aluminum	D [c]			
Antimony	-- (a)			
Arsenic	A (a)	1.75E+00 (a)	1.5E+00 (b)	4/10/1998
Barium	-- D (a)			
Beryllium	~~B2~~ B1 (a)	4.3E+00 (a)	None (b)	4/3/1998
Cadmium	B1 (a)			
Chromium (total)	-- D oral, A inh.			
Cobalt	--			
Copper	D (a)			
Cyanide	D (a)			
Iron	--			
Lead	B2 (a)			
Manganese	D (a)			
Nickel	A (a)			
Selenium	D (a)			
Vanadium	D (d)			
Zinc	D (a)			

(a) IRIS, Integrated Risk Information System, 1993
(b) IRIS, Integrated Risk Information System, 2004 (http://www.epa.gov/iris/)
[c] Interim value from ECAO, 1992
(d) Interim value from NCEA, Region IX, 10/2003
(e) Health Effects Assessment Summary Tables (HEAST), FY 1992
(f) Health Effects Assessment Summary Tables (HEAST), FY 1997
(g) Region I value

Table 2
Current Toxicity Criteria for Non- Carcinogens

Constituent	Old Oral Rfd mg/kg-d	New Oral RfD mg/kg-d	Date Changed
Acetone	1E-01 (a)	9E-01 (b)	7/31/2003
Benzene		4E-03 (b)	4/17/2003
Butanone, 2-	5E-02 (a)	6E-01 (b)	9/26/2003
Chloroform	1E-02 (a)	Same (b)	
Chloroethane	4e-01 [c]	Same (d)	
Dichlorodifluoromethane	2E-01 (a)	Same (b)	
Dichloroethane, 1,1-	1E-01 (e)	Same (f)	
Dichloroethene, 1,1-	9E-03 (a)	5E-02 (b)	8/13/2002
Dichloroethene, 1,2- (total)	9E-03 (e)	Same (f)	
Dichloropropane, 1,2-			
Dioxane, 1, 4-			
Ethyl Benzene	1E-01 (a)	Same (b)	
Methylene Chloride	6E-02 (a)	Same (b)	
Methyl-2-Pentanone, 4- (MIBK)	5E-02 (a)	Same (b)	4/25/2003
Tetrachloroethene	1E-02 (a)	Same (b)	
Toluene	2E-01 (a)	Same (b)	
Trichloroethane, 1,1,1-	9E-02 (e)	2.8e-1 (d)	10/15/2003
Trichloroethene	6E-03 [c]	3E-04 (d)	8/1/2001
Vinyl Chloride	None	3E-03 (b)	8/7/2000
Xylenes, Total	2E+00 (a)	2E-01 (b)	2/21/2003
Bis (2-ethylhexyl) Phthalate	2E-02 (a)	Same (b)	
Dibenzofuran	4E-03 [c]	2E-03 (d)	10/15/2003
Diethyl phthalate	8E-01 (a)	Same (b)	
Di-n-butylphthalate	1E-01 (a)	Same (b)	
Fluoranthene	4E-02 (e)	4E-02 (b)	7/1/1993
Fluorene	4E-02 (e)	4E-02 (b)	
Methylnaphthalene, 2-	None	4E-03 (b)	12/22/2003
Methylphenol, 4- (p-cresol)	5E-03 (e)	Same (f)	
Naphthalene	4E-02 (e)	2E-02 (b)	9/17/1998
Phenanthrene	4E-02 (e,g)	2E-02 (b,g)	9/17/1998
Pyrene	3E-02 (a)	Same (b)	
Aluminum	1E+00 [c]	Same (d)	
Antimony	4E-04 (a)	Same (b)	
Arsenic	3E-04 (a)	Same (b)	
Barium	7E-02 (a)	Same (b)	
Beryllium	5E-03 (a)	2E-03 (b)	4/13/1998
Cadmium	5E-04 (a,h)	Same (b,h)	
Chromium (total)	5E-03 (a,i)	3E-03 (b,i)	9/3/1998
Cobalt			
Copper			
Cyanide	2E-02 (a)	Same (b)	
Iron			
Lead			
Manganese	5E-03 (a)	2.4E-02 (j)	11/1/1996
Nickel	2E-02 (a,k)	Same (b,k)	
Selenium	5E-03 (a)	Same (b)	
Vanadium	7E-03 (e,k)	1E-03 (j)	
Zinc	2E-01 (b)	3E-01 (a)	10/1/1992

(a) IRIS, Integrated Risk Information System, 1993
(b) IRIS, Integrated Risk Information System, 2004 (http://www.epa.gov/iris/)
[c] Interim value from ECAO, 1992
(d) Interim value from NCEA, Region IX, 10/2003
(e) Health Effects Assessment Summary Tables (HEAST), FY 1992
(f) Health Effects Assessment Summary Tables (HEAST), FY 1997
(g) Value is cross-assigned from Naphthalene
(h) Cadmium RfD is for water, 1E-03 mg/kg-d is the RfD for food
(i) Value is for hexavalent chromium
(j) Region I value
(k) Value is for nickel, soluble salts

Table 3: Comparison of MCLs and VPGQS

Carcinogenic Constituents	ROD-Based IGCL mg/l	Current MCL/VPGQS (mg/l)	Source
1,1-Dichloroethene	0.007	0.007	MCL [a]
Benzene	0.005	0.005	MCL [a]
Methylene Chloride	0.005	0.005	MCL [a]
Tetrachloroethene	0.0007	**0.005**	**MCL [b]**
Trichloroethene	0.005	0.005	MCL [a]
Vinyl Chloride	0.002	0.002	MCL [a]
1,4-Dioxane	NA	**0.02**	**VPGQS [c]**
Bis(2-ethylhexyl) phthalate	0.006	0.006	MCL [a]
Arsenic	0.05	**0.01**	**MCL [a,d]**
Beryllium	0.004	0.004	MCL [a]

Non-Carcinogenic Constituent	ROD-Based IGCL mg/l	Current MCL/VPGQS mg/l	Source
1,2-Dichloroethene	0.07	0.07	MCL [a]
Acetone	3.7 (RB)	**0.7**	**VPGQS [c]**
Trichloroethene	0.005	0.005	MCL [a]
Vinyl Choride	0.002	0.002	MCL [a]
Aluminum	NA	**0.2**	**VPGQS [e]**
Antimony	0.006	0.006	MCL [a]
Arsenic	0.05	**0.01**	**MCL [a,d]**
Chromium (as hexavalent)	0.05	**0.1**	**VPGQS [c]**
Manganese	0.18 (RB)	**0.84**	**Risk Based [f,g]**
Nickel	0.1	**0.1**	**VPGQS [c]**

Bold = changed interim groundwater clean-up level

[a] National Primary Drinking Water Regulations, June, 2003

[b] VPGQS for Tetrachloroethene = 0.005 mg/L, January 20, 2000

[c] Vermont Primary Ground Water Quality Standards, Chpt 12: Ground Water Prote
Rule and Strategy, January 20, 2000

[d] The Safe Drinking Water Act requires EPA to revise the existing 50 parts per billic
arsenic in drinking water. EPA is implementing a 10 ppb standard for arsenic to be
as of January 23, 2006.

[e] Secondary VPGQS for this compound. Per Chpt 12: Ground Water Protection Ru
and Strategy, January 20, 2000:
"An activity shall not cause the groundwater quality to reach or exceed the second
standards or 110% of the secondary background ground water quality standards e
under 12-704, whichever is greater"

[f] Calculated risk-based value, due to lack of primary ground water standards